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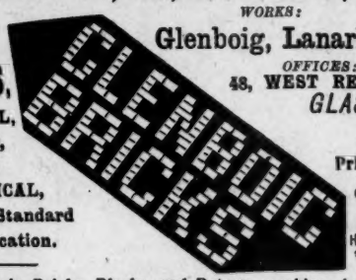

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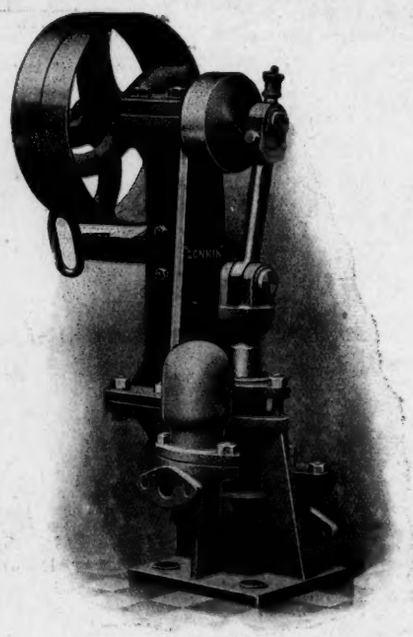

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VOL. CXXXIV., No. 2766.] TUESDAY, MAY 16, 1916. [68TH YEAR.

EDITORIAL NOTES.

Coal Supply—A Serious Danger.

THERE will be unanimous accord throughout the gas industry with the spirited protest made by the President of the Eastern Counties Gas Managers' Association (Mr. A. E. Broadberry), at the meeting of the members at Tottenham last Friday, against the worthless circular issued by the Board of Trade, requesting a diminution by 10 per cent. of the coal used for lighting (not for all purposes), and with his grave warning as to the impossibility of keeping gas supplies going next winter in many cities and towns, unless steps are forthwith taken to see that gas-works are furnished with the necessary quantity of coal. Failure to keep gas supplies going will mean—this is equally or more important—inability to maintain the provision of benzol and toluol up to anything like the line to which perseverance in achievement has already raised that provision. The Board of Trade, counselled by the Coal and Coke Supplies Committee, have made a lamentable blunder, which they ought to take immediate action to rectify, or, if they will not admit their error by doing so, then the Ministry of Munitions should move the Government in the matter, and seek their own protection, and that of our Army and Navy, by securing the withdrawal of the circular. Mr. Broadberry is rightly resentful over entrusting to Committees, who are out of touch with, and have no knowledge of, primary necessities in these critical times, control over such an important matter as that of coal supply. The circular (which is literally rent and torn into pieces in the address) is a striking condemnation of, at all events, one of the Committees that was expected to do so much in the way of regulating supplies in a manner that should serve the best interests of the country.

How can gas undertakings reduce the consumption of coal by 10 per cent. of that used for lighting purposes? Through the shrinkage of the number of available tank-steamers, there is an immense shortage of oil for carburetted water-gas making, and coal must be had to compensate for this shortage; so that, instead of the gas industry requiring a lessened quantity of coal, it will actually want more. Yet coal stocks in May are in many cases moving down-hill at a rapid rate. Colliery owners, too, are refusing to renew contracts; others are cutting-down tonnage; and the Price of Coal (Limitation) Act is being flouted right and left. But coalowners are making the amazing and amusing stipulation, while asking buyers to renounce their rights under the Act, that, should any increase of the 4s. standard price be made by the Board of Trade, it should be added to the new contract price. The coal position is an inglorious muddle; and it shows the dismal ineptitude of the responsible Government Department to keep a firm control over the coalowners. In other words, we are faced with the spectacle of the defeat of a Government Department at the hands of coalowners acting in concert.

The situation is a serious one—serious not only for gas undertakings, but for the country at large in respect of the maintenance of its power to carry on the war. This being so, the requirements of gas undertakings should be satisfied before there is any thought of additional export to, and any additional revenue from, neutral countries. The coalowners have played their game well; the Board of Trade have been as plastic-clay in their hands. In not having taken counsel with the lighting authorities of the country before issuing their useless circular, the Board have also shown culpable neglect of elementary care. One suggestion Mr. Broadberry makes is that, in view of the paramount importance to the production of high explosives that there should be no falling-off in the normal seasonal quantity of coal carbonized—normal under the current conditions of restricted lighting and individual economy—there should be established a Gas Coal Department in connection with the Ministry of Munitions. After the present experience of a Government Department attempting (without, we will concede, aforethought) to injure, at one stroke of a misguided pen, the persistent, plodding work of the High Explosives Department, the suggestion of Mr. Broadberry is perhaps one to which the Ministry of Munitions might give attention with a view to materialization. At any rate, the protection of the High Explosives Department demands that some action be taken.

No Procrastination.

THE matter of a thoroughly representative organization for the gas industry was touched upon—rather obscurely and indirectly—by Mr. A. E. Broadberry, on Friday, in his Presidential Address to the Eastern Counties Gas Managers' Association. As President-Elect of the Institution, it is quite fitting and proper that, at this inchoate stage in consideration, he should be somewhat indefinite and non-committal in any public references to the subject. It is also fitting and proper that the prospective tenant of the place of highest honour in the gas profession should be jealous of the position of the Institution. We use the term "position" as being preferable to "reputation," as there are divided opinions as to the reputation of the body as representative of the interests of the industry in their entirety, and as supplying an organization having the power of full and effective operation in all matters. Mr. Broadberry says he has been sorry to notice a large tendency recently on the part of some of the members to appeal for help to the wrong quarter; and he urged loyal support of the Institution. We know that Mr. Broadberry will not object to frank speaking. He, in effect, asks for it in his expression of sorrow as to the diversion from the Institution of applications for assistance. The question as to whether the appeal for help is sent to the "wrong quarter," is a matter that is best answered by those making the appeal. Our information is that the seeking of advice not from the Institution but elsewhere is due to differences in routine and availability. In the "wrong quarter," there is said to be, on request, prompt rendering of dependable information by those qualified to give it; in what should be, according to the President-Elect, the "right quarter," there is much less prompt dealing—there is a certain routine to be complied with gravely and in detail, and so, though the ultimate information may be dependable, it is not so readily accessible. Again, it is not always due to gas engineers that appeal for help is made to the *soi-disant* "wrong quarter;" but it is frequently (apart from routine and ready access) owing to the fact that chairmen, directors, committeemen, and executive heads of departments other than engineering have direct connection with the "wrong quarter," which they are naturally satisfied is the better one for their particular purpose. It is customary to apply for advice to a competent friend, and not to a stranger. Mr. Broadberry also says that the tendency which he deplores is a "large" one. The quantitative term is not complimentary so far as the Institution is concerned.

However, Mr. Broadberry makes one admission, and an oblique hint—the latter through recourse to an axiom of unknown period of origin. In the early part of his address, he remarks: "The interests of our industry change so "rapidly from day to day that anything said to-day may be "out of date to-morrow." Towards the end of the address, in the reference to the Institution, there is the observation: "Doubtless changes in its constitution—and radical changes "—must shortly be made to render it fit for the altered needs "and modern conditions of the industry; but now is not, "in my opinion, the right time to discuss them." The first quoted passage shows the need for a more representative and powerful organization; the second quoted remark is to all intents and purposes an admission of the inadequacy of the Institution for dealing with all matters in the name of all interests that, synthetized, constitute the gas industry.

But the opinion that now is "not the right time" to discuss the changes suggests, though it is not specifically said in the address, that Mr. Broadberry has delay in his mind. If he means this, then all we can say is that procrastination is a bad enemy; it is one of the worst from which the Institution has suffered. It is owing to procrastination that within the Institution itself there are to-day divided views as to its operative efficiency for general and special purposes—other than technical. When throughout the country reorganization, and the proper fitting of industries for new work and new conditions, are being spoken of; when there is recognition that new conditions are many and severe, and that after-war circumstances will be still more severe—it seems to us that there is no time like the present for getting on to the road to the consummation of needed reform. In an eloquent speech the other day, Mr. W. H. Hughes, the Prime Minister of Australia, said: "That industry which is most completely "organized is, generally speaking, the most successful." Let this truth stimulate thought.

Then there is the old adage, upon which Mr. Broadberry apparently hangs an indirect pronouncement of personal view. He remarks: "There is an old saying that 'Too "'many cooks spoil the broth.' That is very true. But I "would like to add: 'Lord help the broth if someone asks "'the housemaid, the kitchenmaid, and the gardener to take "'a hand as well.'" A whole sheaf of maxims could be set up to counter the one cited. But that is unnecessary. Reply may be made from the same coinage: "Lord help "the industry that expects one man to have supreme ability "in all things." And, again, "Lord help the professional "gas man who thinks that all the talents and knowledge "necessary for the conduct in detail of the industry are resi-"dent in him." We have yet to learn, too, that a composite Board of Directors has spoilt the "broth" of the Tottenham Light, Heat, and Power Company; we have yet to learn that what is good for that Company is not good in the composition of the industry's central organization. And further we have yet to learn that those many men of the gas industry who are not engineers, but have given good service in the general interests of the industry, deserve to be classed with the housemaid, the kitchenmaid, and the gardener. We cannot help thinking that, on further reflection, Mr. Broadberry will regret his unhappy choice of maxim.

Re-organization is not confined to this country. It is engaging attention in, among other countries, America. The Americans are far-seeing. They see on the horizon new conditions, becoming yet more pronounced and more strongly defined, which are arising from the world-transforming war. They are preparing—not procrastinating. Want of preparation has been in more things than the war our country's curse; it almost led to disaster at the beginning of the war. "Consolidate" is the heading of an article in the last number to hand of our American contemporary "Gas Record;" and the first paragraph reads: "Recent "developments have suggested to a number of influential "factors in the gas field that possibly the time has arrived "for serious consideration of a plan under which the "National Commercial Gas Association and the American "Gas Institute may be consolidated." The gas industry of this country does not want consolidation of all existing organizations so much as complete representation of interests in a premier body. Re-organization is running through the world; and one of the greatest lessons that has been brought home to us by the war is that our industrial organizations have lacked constitutional completeness. Let this lesson not be lost upon the gas industry; for in completeness there is power.

The Control Book.

Control by chemical analysis of the processes of gas manufacture is productive of an excellent reward in economy; but this method of control is by itself insufficient. It requires as a companion a system of close control by continuously kept working and cost data; and it was this particular aspect of control that Mr. J. Terrace, of Grimsby, dilated upon, in a paper which, at the meeting of the Eastern Counties Gas Managers' Association, he presented with all modesty, but which contained very material suggestion for those who have not so far adopted such a system. The title, "The Control Book," is significant of importance and utility; and the details of the method of control that Mr. Terrace gives in his explanation and by sample forms are sufficient confirmation. The fundamental idea is to enable a month-by-month record and analysis to be maintained and preserved of working and cost data, which will enable a closer control to be kept over these factors in prosperity than can be the case by relying on the more infrequent secretarial compilations—available a month or two after the expiration of a half year, and then of no value for assisting in governing the operations of that half year. Only by the closest contact with actualities can there be any control of the conditions; and this close contact is, as said, the main object of the control book. Point was made as to the deceptive appearance of the forms. They look most elaborate. So does all system that has for its object the showing of result by analytical data. But once there has been adoption, and the short-period statistical process of control has been amalgamated with the daily or monthly round, Mr. Terrace says it is surprising how little work it really entails, but how advantageous the results. "Even," he says, "if it entailed a considerable amount of labour, "the value of the information would justify the expenditure "of that considerable amount of labour." Such a data-composed control book enables, so far as market conditions will allow, close checking to ascertain that the best standards of working results and costs are being maintained, and so indicates when divergence from these standards calls for investigation as to the causes. Of course, the best standards of one concern may not be the best attainable standards, as disclosed by the working of another, and comparatively conditioned undertaking; and Mr. Terrace advocates the use of the data at the end of completed half years for instituting contrasts with other concerns. But such contrasts must be made with discretion—"discretion," because (as pointed out in the paper and by Mr. E. J. K. Fussell in the discussion) since the form of accounts was prescribed by the Gas-Works Clauses Act, 1871, there have been vast changes in, for instance, the distribution expenditure, and items are rendered incomparable by the inclusion of charges—such as depreciation—on lines that are sometimes controlled by the degree of prosperity of the half year. The details of the control book are set out in the paper, and so they can be investigated and criticized. Mr. Terrace would welcome criticism of, and suggestion for improving, the system, for the idea of which he does not claim originality. He has, however, developed the details for his own particular circumstances; and he indicates a further development in the paper. The concerns that have incorporated in their managerial methods such a system of control are the exception rather than the rule; and to set the plan before those who have not adopted anything similar was one of the purposes of the paper.

The Advent of Daylight Saving.

Our legislators do not appear to concern themselves much over what some enthusiastic people regard as quite a revolution in our social habits—that of rising one hour earlier, and, according to theory, retiring to bed an hour sooner. While the discussion was proceeding in the House yesterday week, on Sir Henry Norman's motion—"That, "in view especially of the economy in fuel and its transport "that would be effected by shortening the hours of artificial "lighting, this House would welcome a measure for the "advancement of clock time by one hour during the summer "months of this year"—the benches were sparsely occupied by members; and only 172 took part in the voting—the odd two being the sum total of those in opposition. A Bill has since been introduced for giving the resolution legislative effect; the proposal being that our timepieces shall be advanced by an hour from two o'clock on Sunday morning next (May 21) and that the new time shall continue to the same hour on the morning of Sunday, Oct. 1—that is to say, for nineteen weeks in all, or a saving of 133 hours of daylight, and, it is assumed, of 133 hours of the cost of artificial lighting.

It has been amusing to read the inflated estimates as to economy that have been promulgated from the House and through the Press by those in favour of the change—estimates made by visionaries who have no possible means of calculating with any degree of exactitude what saving is likely to be effected either in lighting bills or in the quantity of coal that is consumed in the provision of this lighting. Reasoning and computation have run riot through having no fixed bases; but as there is nothing much to be lost by making the experiment, people have been content to let the specious arguments as to gain go without chal-

lenge. "Millions" sterling have been spoken of as the possible saving. Sir H. Norman mentioned £2,500,000 as, taking the country through, the measure of economy that would be effected; and Mr. Barnes, one of the Labour members, reckoned that, in domestic and street lighting alone, no less than £180,000 a week would be saved, which would amount in the nineteen weeks to £3,420,000. During the weeks in question, we have, in normal times, the smallest number of street-lighting hours of the year; during these weeks shops are generally closed, excepting in Saturday-night shopping districts, before artificial lighting is really needed; and normally artificial lighting for factories is rare during these weeks. The legislative fiat, too, will make very little difference to the lighting in factories engaged on munitions work; it will make a difference in the case of railway station lighting, licensed premises, and shops that keep open for trade on Saturday nights. In the main, however, the largest consumers of gas for lighting purposes have closed their premises in the summer before any artificial lighting is required. This brings consideration to the domestic consumer. Assuming (we doubt if such an assumption has any sound foundation) that the new time condition will result in the saving of 133 hours of artificial lighting, what would this really mean? For illustration, suppose that for domestic lighting—taking the prepayment and ordinary consumers together—the average quantity of gas used is 10 cubic feet per hour, this would mean a saving per householder of 1330 cubic feet of gas during the period of changed time, and a value, at (say) an average war price of 3s. per 1000 cubic feet, of 4s. for the period between May 21 and Sept. 30. There are no data which inform us as to the aggregate number of domestic consumers of gas for lighting. In the last Board of Trade returns relating to gas undertakings, the total number of gas consumers for all purposes, excluding non-statutory concerns, was given as 2,888,248. This number, however, includes industrial, shop, office, and railway consumers as well as those private consumers who use gas for cooking and heating and electricity for lighting. But if we assumed that all the 2,888,248 consumers were users of gas for domestic lighting, and saved an average of 10 cubic feet of gas per day for lighting, or 4s. worth over the period of the hour-per-day saving of artificial light, the total saving would be £577,649. This figure has no genuine value, for it embraces all the consumers who do not use gas for lighting and all those whose lighting accounts in the summer are next to *nil*. What, however, it does show is that estimates as to economy in the matter of artificial lighting have been beautifully exaggerated; for no such savings are possible from the cutting out of an hour's artificial lighting per day in the summer time.

But will the new legislative command as to advancing time by one hour actually have the effect of sending people to bed an hour earlier? We doubt it. It is more probable that it will have the effect of restoring the hours of bed time to those that obtained in pre-war times. It is a matter of general observation that, since restricted street lighting came into force, and inducements to remain out-of-doors at night time have been curtailed, people have been retiring to bed, without legislative interference, earlier than formerly. And no Act of Parliament will send them to bed now an hour or two after daylight fails. On the contrary, they are likely to stay out of doors during the summer until daylight ends; and they are very unlikely to drop into bed immediately after returning home. It is more probable than not that the Act will (as we have said) have an enabling effect in the matter of the restoration of the shorter number of hours in bed that obtained before the war; and so there will be no real saving in artificial lighting hours as they have existed in the home since the public lighting restrictions have been in force, and since the "boys"—an important factor in the keeping of late hours—have been away from home. There are a few people, too, who have refused to go to bed until the critical Zeppelin hours have passed. As Zeppelins do not arrange their comings and goings by the clock, but by the hours of light and of darkness, these people will still prefer to be awake, instead of in a state of "suspended animation," until after the critical hours have passed. Thus, the more we look into the matter, the more dubious do we become as to the realization of anything approaching the published estimated savings.

The Home Secretary (Mr. Herbert Samuel), during the discussion in the House yesterday week, affected, by platitude, to reduce those concerned in gas and electric light undertakings to proper place and state of humility. He observed that such concerns existed for the service of man, and man did not exist in order to be their customer. Also that if the suggestion as to daylight saving was good in itself and practicable, the interests which depend for their incomes upon the supply of artificial light must adapt themselves to the changed circumstances. With all of which we are in perfect accord. But among the services that gas undertakings are rendering to man at the present time is the provision of essentials for conducting the war; and their ability to do this is limited by the quantity of coal carbonized and the output of gas. It seems to be necessary to be constantly reminding our legislators of this, and of the fact that, in war time as well as in peace time, there exists such a thing as false economy. But we need not reiterate the arguments on this point, seeing that they were set out in last week's editorial article on the Board of Trade circular. However, the gas industry cannot do more to assist the Government and the country than the limits of their opportunities will allow; and thus we are face to face with the anomalous situation that the Government and Government Departments are doing their best to condense to the utmost these opportunities, while the Ministry of Munitions are urging the gas industry to supply more and yet more of the ingredients necessary for the making of explosives and other military necessaries. While, too, the Government are talking of the economy of coal, one department at least is encouraging low-temperature carbonization which gives (as pointed out last week) the paraffins rather than benzenoid compounds, and leaves in the coke valuable volatile matter. If the Government Departments will pursue a course of repression and decline facilities to the coal-carbonizing industries, of course the Ministry of Munitions cannot complain if their request for more benzol, toluol, &c., does not meet with the quantitative response considered necessary.

Modern Plant for Moderate Sized Works.

The discussion on the paper that Mr. J. E. Lister Cooper, of Yeadon, read at the last meeting of the Yorkshire Junior Gas Association, on the new plant of the Yeadon and Guiseley Gas Company, showed that it contained many debateable details. But the main outstanding feature of the contribution is that, with the adoption of new plant, there has been a large decrease in the capital expenditure per million cubic feet of gas made—the capital now standing at about £580 per million cubic feet. That is good. The new retort-house contains horizontal settings and stoking machinery and material-handling plant driven electrically. One aim in the new plant has been to improve production—in both gas and residuals—not only in quantity but in quality. Toogood's patent charger has been installed. Mr. Cooper says that by this machine the charge is stratified; the slack and small coal lying on the bottom of the retort and the lumps on the top—the open formation of the top of the charge allowing easy egress of the gas from the densely lying slack. The coke is compact; and, with a view to preserving its quality, it is quenched in chambers sunk beneath the discharging-floor, from which chambers it is removed in trucks. Decreased costs per unit of production, and better working results quantitatively and qualitatively, are very essential as aids to progress in days of dearer materials and labour costs, and strong active competition.

The Oil-Washing of Gas.

Travelling among the men of the gas industry, it is found that infinite harm has been done by the ill-advised circular of the Board of Trade as to the 10 per cent. reduction of the present quantity of coal used for making gas for lighting purposes, while the Ministry of Munitions are urging gas undertakings to increase the production of benzol and toluol by employing as the gas-washing medium oil instead of tar. The feeling is that the Government are not doing anything to assist the industry in complying with the requests of the Ministry of Munitions to maintain, let alone enlarge, the supply of benzol and toluol. In the circumstances, it was not surprising that a letter from Mr. F. L. Halford, of the High Explosives Department, that was read at the meeting of the Eastern Counties Gas Managers' Association last Friday was listened to with somewhat chilly silence. The letter urged the adoption of an oil-washing process, and where possible a distillation plant, for the treatment of the saturated oil. Gas men have responded well to appeals hitherto made by the Government

representatives; but time after time they are being faced with the very discouraging fact that there is no reciprocity, and that there is actually a serious repression of their desire to loyally perform a great national service. Coal is not coming in as it should be—if only for this high explosives work; reduced consumption of gas is advocated by the Board of Trade; and the managers of the smaller undertakings who cannot run a tar-dehydrating plant tell us they are losing tremendously on their tar compared with before the war, because (quite apart from the condition of the pitch market) the tar distillers decline to pay them the increased value of the tar that has been enriched by washing the gas. These undertakings ought to be defended. But about the oil-washing process, Mr. Thomas Glover, at the Eastern Counties meeting, suggested that the small undertakings (who are not in a position to instal a distilling plant) might adopt the system by co-operation with larger works in a position to run a distillation plant. He suggests that at the smaller works the gas should be washed by oil; the saturated oil sent to a gas-works with a distillation plant; the larger works, after eliminating the benzol and toluol, returning to the smaller works the oil for re-use in the washing plant. He has been experimenting in the matter; and the scheme is found to pay both the Norwich works and a small neighbour. This looks hopeful. It is another step on the road to co-operation in the economic working-up of residual products, and to release from those who have hitherto not been dealing with conspicuous fairness in the purchase of the raw residual material of gas-works.

Lighting Research.

The Council of the Illuminating Engineering Society have energized their Research Committee into initial activity. The Committee was brought into being in 1914; but the war, responsible for so much, is also guilty of being the cause of deferring a start by the Committee in its appointed work. Organization and research are of the commonly discussed and necessary contributions to our country's internal development; and while research is being talked about and arranged for, the Illuminating Engineering Society wants to do its part in seeing that illumination, and all it involves, is placed by adequate exploration on a higher plane, and in a manner that shall have general applicability and due acceptance. Illumination is a component of (say) industrial equipment which is as essential to efficiency as much else that could be mentioned; and illumination specialists, formed into a Committee well balanced in numbers representative of the illuminating agents, can do much to help forward both research and progress. The Research Committee of the Society have, therefore, taken a preliminary step by surveying the ground of possible work. The abstract (printed in other columns) of the report which they have presented as to the results of their survey, pegs out an area of ground for work that is almost alarming, and suggests provision for investigation which, with the problems that are bound to arise as the side-issues or extensions of the original research, will suffice for keeping the investigating illuminating engineers industrious for some generations. The subjects are all important—many of them very much so; and they range over measurement, definition prescription, glassware, and so forth in a way which shows strict impartiality and a desire for comprehensiveness. To attempt to attack all the questions in the immediate future, even with the co-operation of other societies, would only mean indifferent work. There will have to be selection; and the subjects first taken in hand should be those that will bring an early harvest of practical value.

Enemy Property in England.

There are some significant figures to be found in the part of the eighth general report of the Public Trustee which deals with his duties as Custodian of enemy property in England in connection with the Trading with the Enemy Amendment Acts and various Proclamations. The report is for the year to March last; and it seems that at this date the total enemy property, including debts, in this country, as notified or paid over in accordance with these Acts, was of a value of £134,000,000. As affording some basis for a comparison, attention is drawn to the fact that, at the request of the Treasury, in consultation with the Foreign Office, a system was last year instituted whereby British persons resident in the United Kingdom could make voluntary returns of property held for them in enemy countries, and any debts due to them from persons or firms resident or carrying on business in enemy countries. Estimated on the results of this registration, the total value of British property, including debts, in enemy countries, figures out at £90,000,000. This registration was undertaken with two objects; the main one, of course, being to arrive, as nearly as could be done by a voluntary system, at a comparative state of account as between this country and each of the enemy countries. In so far as the registration may be considered to have achieved its intention, it is evident this country is very well on the right side. The return was, in the second place, designed to obtain information which might be made available for creditors, either now or on the conclusion of hostilities, desiring to take joint action for the preservation of their respective interests.

A New Point on Compensation.

War conditions have succeeded in yet another direction in bringing about what might under other circumstances well have been regarded as being impossible. That is to say, the prevailing abnormal position of affairs has been responsible for the raising of a point under the Workmen's Compensation Acts on which it is said that no decision has as yet been given by the Higher Courts. This new question, which a County Court Judge has just been asked to decide, is whether, in assessing or re-assessing compensation under the Acts, war bonuses should be included in the wages or earnings. It came up in connection with an employers' application to reduce the compensation payable to a man who met with an accident, and lost a leg, some years ago, when earning 31s. a week. He was given another post at 22s. a week, with compensation of 6s.; and since that time, his wages have been advanced 4s., and a war bonus of 3s. a week added. It was under these circumstances that the application was made; the contention being that the most the man was now entitled to was the difference between his present earnings and his wages at the time of the accident; so that the compensation should be reduced from 6s. to 2s. a week. This was the view taken by the Judge, who, however, in making the reduction asked for, said that immediately the war bonus was taken off, or the man's earnings decreased from another cause, application could be made to the Court for a further revision of the compensation.

Municipal Gas-Works Results.

Once more the time has come round for the rendering by those responsible for the administration of municipally owned gas undertakings of an account of their stewardship. The twelve months covered have constituted a period unparalleled in the history of the country; and, therefore, it would be unreasonable to look for normal results. Dear coal, labour, and materials, together with restricted public lighting, have been the general experience; but consumption for other purposes has gone up or down according to the particular influence which the war may have had upon the town concerned, while in the great majority of cases the effects of higher charges for gas have to be borne in mind in considering the figures. Among the results so far recorded, it is seen that a net profit has resulted at Blackburn of £5229, which compares with losses of £6618 and £10,322 in the two preceding years, and much satisfaction is felt with the report. There has been realized a net profit of £12,000 at Blackpool; the total income having been £116,760, as against an estimate of £94,000. At Dukinfield a net profit of £1100 compares with a loss for the previous year of £1960. The quantity of gas sold here exhibits a small increase. Leek also sold more gas to private consumers (though not sufficient to make up for the decreased public lighting), and also, too, at a higher price; the net profit, at £1200, comparing with £450. Under the head of purification a substantial profit has been realized, in place of an entry on the expenditure side of the account. In the course of a discussion on the old topic of the disposal of gas profits, it was stated in the Macclesfield Town Council that the profit for the past year was £1060 in excess of that of the previous year, in spite of a consumption which was over 18 million cubic feet less, and the greatly enhanced cost of coal. An increase made in the price of gas did not cover the extra outlay on coal—the excellent results of the year, it was pointed out, being entirely due to good management. In the case of Nelson, a net profit of £3572 compares with £5299 for the year before. At Nottingham, it is evident the past year's working has been of an entirely satisfactory character, judging from the

anticipated ability of the Gas Committee to continue their contributions in relief of the rates on a scale but very little less handsome than that to which the ratepayers have of late been accustomed. Substantially increased returns are reported from Rochdale; and at Rotherham also, at £7080, the net profit shows some increase.

Schemes for Increasing Coal Output.

There is to be a conference of representatives of the Miners' Federation with the coalowners to-day, to consider proposals by the Home Office as to the best means of increasing the output of coal for meeting home requirements, the wants of our Allies, and to enlarge the export business. The proposals are the further employment of women for suitable labour on the surface of collieries, the reduction of the age-limit of boys employed, the lessening of absenteeism, the utilization of the extra one hour per day for sixty days of the year as provided by the Eight Hours Act, and the revival of consideration as to the extent to which the Eight Hours Act might be suspended in individual districts. These proposals have, at the request of the Coal-Mining Organization Committee, been communicated by Sir Richard Redmayne to the Miners' Federation; and that body has given instructions to the Executive as to the line of action they are to take at the joint conference. There is to be opposition to any suspension of the Eight Hours Act; but freedom as to working the additional hour on sixty days in the year. The Federation are also in general opposition to the further employment of women on the pit banks, and to the reduction of the age from 14 to 13 years of boys for underground labour. As to wilful absenteeism, the Executive will be prepared to co-operate with the employers in its elimination. On this point the Coal-Mining Organization Committee have estimated that, were there no avoidable absenteeism, the output of coal would be increased to the extent of between 13 and 14 million tons per annum. Reduction of absenteeism, they think, is by far the best means of raising the output; and they ask, Is it too much to hope that an additional 10 million tons per annum may be secured by this means? The miners alone can answer this question.

OBITUARY.

LAURENCE W. S. ROSTRON.

Co-partnership has lost a keen and able advocate through the death of Mr. Laurence W. S. Rostron, M.A., of Sloane Court, S.W., who passed away at Broadstairs on Sunday, at the early age of 43. On various occasions (frequently travelling considerable distances to do so) he read papers and took part in discussions having for their object the propagation of co-partnership and profit-sharing principles; and no doubt much of the faith which he had in the beneficial results attending the introduction of such systems was the outcome of his close relationship with the South Metropolitan Gas Company, of which, since 1911, he had been a Director, as his father (the late Mr. Simpson Rostron) was before him. Mr. Rostron was a barrister of Lincoln's Inn, and the author of a book on the "Powers of Charge of the Metropolitan Gas Companies." This was a history of the question of the price of gas in the Metropolis, from the introduction of gas lighting down to the year 1900, and it was published with a preface by the late Sir George Livesey. He also did a good deal of work in connection with the London County Council, while acting as the representative of Central Finsbury. The funeral is to be on Thursday, at Beddington, Surrey.

Mr. Arthur J. Dickinson, F.I.C., F.C.S., the Governing Director of Messrs. Arthur J. Dickinson, Limited, of the Neptune Tar-Works, Deptford, died on the 4th inst., in his seventy-fifth year. The deceased gentleman was for many years interested in gas-works undertakings throughout the country, and had for practically speaking all his life been connected with the tar industry.

Mr. Edward Jackson, whose recent death was briefly recorded in the "Journal" last week, was born on June 7, 1858, and died on the 16th ult., at his residence in Moseley, near Birmingham, after a short illness. Many of his relations, friends, and colleagues were present at the interment, which took place on April 19, in Hill Cliff Cemetery, near Warrington. Deceased was educated at Mr. Rigg's School, Southport, and at Owens College, Manchester, where he distinguished himself specially in chemistry, studying under Sir Henry Roscoe, F.R.S., and Professor Schorlemmer, F.R.S., and taking the analytical prize. On leaving college, he accepted the position of Chemist to Messrs. Wigg Bros. and Steele, at Runcorn, and remained there until 1882, when he was appointed as a Sub-Inspector under the Alkali Works Regulation Act. Dr. Angus Smith, F.R.S. (the Chief Inspector), sent him to Scotland to assist the late Mr. Blatherwick during his illness; and on his recovery, Mr. Jackson took up his residence at Newcastle-on-Tyne, until he was transferred to Birmingham in 1884, on the retirement of the late Mr. George E. Davis. Here he remained until his death—firstly as a Sub-Inspector, and since 1894 as full Inspector of the South Midland District. Mr. Jackson was an excellent chemist, possessing a clear grasp of the many complex problems which are constantly presented to the Alkali Inspector; and he not only executed his official duties in a most judicious and conscientious manner, but his tact and consideration earned for him the respect of a large number of the manufacturers with whom he was officially connected. He was elected a Fellow of the Chemical Society in 1882, became a Fellow of the Institute of Chemistry in 1888, and was an original member of the Society of Chemical Industry.

PERSONAL.

Mr. Arnold W. Branson, the Engineer and General Manager of the Hartlepool Gas and Water Company, has been appointed to fill the position of Secretary to the Company for the duration of the war, in addition to his present duties.

Mr. D. Ritchie, who is now appointed Superintendent at the Ash Road Gas-Works of the Aldershot Gas, Water, and District Lighting Company, has been with Mr. R. W. Edwards (the General Manager) as his Senior Works Assistant and Chemist for the past three-and-a-half years.

Corporal Alfred Burt, of the 1st Battalion of the Hertford Regiment (T.F.), a former employee of the Hertford Gas Company, whose gaining of the Victoria Cross for conspicuous bravery at Cuinchy on Sept. 27 last was recorded in the "Journal" some months ago, was lately the recipient of a public presentation at Hertford Castle. He was met at the entrance of the castle by the Mayor (Mr. R. P. M. Lacey) and Corporation, accompanied by the Marquis of Salisbury (High Steward of the borough), Lord Desborough, and many other prominent town and county residents. On the castle terrace the Mayor handed Corporal Burt a gold watch and chain, £150, and a framed illuminated address, all of which were subscribed for by the townspeople of Hertford. On the occasion when Corporal Burt gained his distinction, his company had lined the front trench preparatory to an attack, when a large minenwerfer bomb fell in the trench. Corporal Burt, who well knew the destructive power of this class of bomb, might easily have got under cover behind a traverse; but he immediately went forward, put his foot on the fuse, wrenched it out of the bomb, and threw it over the parapet, thus rendering the bomb innocuous. His presence of mind and great pluck saved the lives of others in the traverse.

Mr. Harry L. Strange, who is a member of the American Gas Institute, and has for the last ten years been Engineer and General Manager to the Honolulu Gas Company, Limited (an American Corporation owned in Hawaii), recently arrived in this country. We welcome him with a feeling of pride; for he has come so far to champion what he realizes to be the cause of justice and humanity. His Directors refused to accept his resignation, but granted him extended leave of absence, so as to allow him to offer his services to England. Arriving in London on April 13, he was by May 3 in uniform as a Second Lieutenant in the Royal Engineers. It may be mentioned that he previously saw service as a volunteer in the South African campaign, receiving the Queen's Medal and five bars. Mr. Strange says he brings the good wishes of the American Gas Institute and American gas men to their English brothers, and that the heart and sympathy of America are overwhelmingly with their English blood-cousins. This is an intensely gratifying assurance; but it is in no wise unexpected, for the rally from afar round the British Flag has been one of the most striking features of a period of unparalleled events. To quote the one example now before us, little Honolulu, in the midst of the Pacific, has sent 157 men to the front, all of whom have paid their own fares and expenses.

"Gasophalte."—The word "Gasophalte" has recently been registered by the Anglo-Mexican Petroleum Products Company, Limited, of Finsbury Court, E.C., as a trade mark for a certain kind of Mexican asphalt now marketed by the Company for gas making. An extensive series of experiments have shown that a percentage of "Gasophalte" intimately mixed with the coal results, upon carbonizing, in an increased volume of gas with higher illuminating value.

Manchester District Institution of Gas Engineers.—The Institution will hold their 175th quarterly meeting at the Grand Hotel, Manchester, on Saturday, the 27th inst., when Mr. John West, M.Inst.C.E., M.Inst.Mech.E., will read a paper on "Silica and Fire-Clay Materials, giving Practical Examples of their Expansion, Contraction, and Refractory Qualities." The Hon. Secretary (Mr. G. S. Frith) states that a special invitation to attend the meeting and to take part in the discussion on the paper is being forwarded to members of the Refractory Materials Committee of the Institution of Gas Engineers, and also to manufacturers of silica and fire-clay materials. To secure a good discussion, a copy of the paper will be posted to each member prior to the meeting. The business proceedings will be followed by tea.

BOARD OF TRADE AND LIGHTING CONSUMPTION.

Letter from the Institution of Gas Engineers.

We have received from Mr. Walter T. Dunn the following copy of a letter which, as Secretary of the Institution of Gas Engineers, he has addressed to Mr. W. F. Marwood, C.B., of the Railway Department of the Board of Trade, on the subject of the request to gas and electricity undertakings which was reproduced on p. 288 of last week's "Journal."

The Institution of Gas Engineers,
39, Victoria Street,
Westminister, S.W.,
May 13, 1916.

W. F. Marwood, Esq., C.B.,
Board of Trade Railway Department (Coal),
7, Whitehall Gardens, London, S.W.

Sir,—I am directed to say that the attention of the Institution of Gas Engineers has been called to a letter which has been issued from the Board of Trade and addressed to the gas undertakings of the United Kingdom, requesting that the undertakings shall take active steps to bring about a 10 per cent. reduction of the use of coal for lighting purposes by advising consumers to reduce their consumption of gas for that purpose.

I am further to point out that the lighting restrictions at present in force have already had the effect of reducing the amount of gas used for lighting by a large percentage, and that no consumer would admit that gas is being used needlessly or is being wasted.

The experience of gas suppliers is that the use of gas for lighting is at its minimum, and that it is not likely to be materially reduced by the community, who regulate the demand by their requirements and are not likely to be influenced by any such recommendations as your Board suggest.

The proposed Daylight Saving Bill will probably effect some further saving by reducing the number of hours of artificial lighting.

The Institution wish, further, to remind the Board that, owing to the recruiting demands of the War Office, the staffs of gas undertakings are reduced to an inefficient minimum, and that, under the present conditions, it would be generally impossible to find the necessary assistance to make the house-to-house visits suggested by the Board.

On the other hand, the impossibility of making the usual proportion of carburetted water gas through lack of gas oil will call for more coal for gas making; and this will be welcomed by the Ministry of Munitions.

(Signed) Walter T. Dunn,
Secretary.

ELECTRICITY SUPPLY MEMORANDA.

Our electrical contemporaries now and again inveigh against the unjust system of appropriating in aid of the rates the profits of Municipal trading undertakings. We are keen sympathizers.

Profit-Taking in War Time.

Municipal gas undertakings were the objects of this form of plunder long before the electricity supply industry was born; and, despite the altered condition of trading competition, the system of pillaging, instead of slackening-off, has enlarged itself not only by additional seats of operation, but in individual degree. The municipal electricity undertakings of the country have also become the objects of the attentions of the profit-grabbers—that is to say, those of the undertakings that have any net profits, for all of them are not in the blessed condition of being able to boast of profits, and there would be more who could not do so, did they make proper provision for depreciation and for a reserve fund. But our electrical contemporaries are incensed over the continued annexation of profits during war time. "Electrical Industries" is quite surprised to find "local authorities still expecting these undertakings to contribute large sums to the rates in spite of the serious and chronic difficulties of coal supply, the shortage of labour, the increasing cost of materials, and the general uncertainty of the outlook." If our contemporary had had as long and as large an experience as we have had of this inglorious practice of local authorities, it would not be surprised at anything that happened in connection with it, and it would certainly be unable to find presentable words that were harsh enough to apply to it. However, its complaint is illustrated by Manchester. It says that a year ago the Corporation Electricity Committee found it necessary to raise the charges for current by 10 per cent. on lighting and 15 per cent. on power, in order to maintain £30,000 contribution to aid the rates. The increases prove to have been insufficient; and a sum of £1825 has actually been taken from the reserve fund in order to make up the total of £30,000.

In Worse Case.

The Manchester Electricity Department ought to be pleased that matters for it in this regard are no worse. The Corporation have been heavily bleeding the gas undertaking ever since it came into their possession; and, in the shape of profit appropriations, they have taken from it, and therefore from the gas consumers, in the aggregate much more than the outstanding capital of the concern. It would have been thought that the constancy of the department in—reluctantly, true—responding to the calls for money in times of peace would have ensured immunity from similar claims in times of such stress as the present. Not so. Even relaxation is not contemplated. The full "pound of flesh" is still required—neither more nor less. The sum of £50,000 a year must be provided by the Gas Department in aid of the rates whether or not there is a profit balance of that amount. There is no one to step in to protect the gas consumers against the gross injustice of this indirect taxation. Through this the past financial year commenced with an adverse balance of £52,708; and notwithstanding the advance of 6d. per 1000 cubic feet at June 24 last, the year ended with an adverse balance of £41,018. This is the result after providing for renewals of plant, redemption of debt, interest on loans, and the payment of the £50,000 in relief of the rates. Even the reserve fund has had to be sacrificed, in order to comply with the cast-iron insistence of the City Council for a fixed sum from the department, whether or not earned during the year. The current year will be worse still. It is estimated that, under present conditions and prices, there will be an adverse balance of £120,000. It is obvious this sort of thing must not be allowed to continue.

Impotent Organizations.

But who is to move in the matter? "Electrical Industries" says that "it is peculiarly disheartening that even the critical factors introduced by the war have not led to the revision or abatement of a radically unsound policy." We agree. But our contemporary makes further remark, which portrays something very similar to the situation prevailing in the gas industry. It speaks of the influences which overrule the wishes of electricity committees and station engineers in this matter, and adds: "While those engaged in the industry unite in disapproval of a certain line of action, they are unable to alter it. In this case we believe the fault lies at the door of the Incorporated Municipal Electrical Association. The Association has never had the courage to tackle the question, and to organize a protest against a process of piracy which is condemned by the majority of the members." The same thing applies to the Institution of Gas Engineers, which, being a body composed of the technical officers of gas undertakings (a considerable proportion of whom are in municipal service), cannot take any really effective steps in bringing pressure to bear upon Government departments with the view of securing legislative prohibition of the practice, or enactment restricting profit-taking—the former being the preferable course. However, until in the gas industry we get a thoroughly comprehensive organization—comprehensive in its representation of interests—there can be no useful movement made in giving the happy despatch to this iniquitous municipal proceeding. When the gas industry has the satisfaction of having such a central representative organization, it may be that profit appropriation from municipal trading concerns will supply another matter in which the two industries can ally themselves in trying to obtain a permanent conquest over common enemies—in this instance, the profit snatchers.

Enemy Aliens and the I.E.E.

Some time ago allusion was made to the discussion that the Institution of Electrical Engineers had over the question of the expulsion of members of all enemy nationalities. It was then decided to have a postcard canvass of the members, to ascertain their views upon four propositions. The number of cards issued was 3244; and of these only 1470 were returned. So that there were more than half the members who did not trouble their heads over the matter. There were 1320 votes in favour of, and 88 against, the proposal (1) to expel members who are subjects of enemy countries or States. There were 1307 votes in favour of, and 79 votes against, a proposal (2) to expel members who, being naturalized British subjects, have retained enemy nationality. There were 1081 votes in favour of, and 264 against, the suggestion (3) not to expel members who are naturalized British subjects and were formerly subjects of a country or State now at war with Great Britain and Ireland, but who have under the laws of such country or State definitely lost their alien nationality, provided they are able to prove this to the complete satisfaction of the Council. There were 1120 votes in favour of, and 200 against, the proposal that (4) no person shall after a given date be eligible for election as a member of the Institution who is a subject of any country or State with which the United Kingdom is or shall have been at war on or after the date mentioned. The form of resolution to carry out the mandate of the members as expressed by the voting is now under the consideration of Counsel.

Breakdowns, Zeppelins, and Nerves.

In those cities and towns where it has been decided to cause variations in the voltage of the electric current, and then to switch it off altogether, as respectively a warning and a safeguard on the approach of Zeppelins, more than ordinary care ought to be taken not to have, until after the war, any cessations of supply other than those which are intentional. Then, when hostilities are ended, there can be a reversion to the old habit of occasionally giving electricity consumers a change, in the way of personal inconvenience and business dislocation, by suddenly depriving them of the means of light when they have imprudently discontinued possession of gas-lighting fittings. But there is in these days of Zeppelin raids an obligation

upon the suppliers of electricity to make every effort to guard against extinctions which have no cautionary significance, seeing that they are bound to have a bad effect in frightening and upsetting folks of neurotic temperament. In a message to a morning paper from Salonica, just after a Zeppelin was brought down there by naval guns, the following passages appeared: "For weeks and months past, there has not been a quiet night here, and nervous people have been haunted by fear of a visitation. Any accidental stoppage of electrical current would keep half the town awake all night, fearing that the current had been cut off as a warning of the impending arrival of 'the terror that flieth by night.'" The more breakdowns there are of current, the more breakdowns there will be of folks using electricity as a lighting agent. To be uselessly kept awake all night long does not conduce to physical and mental fitness.

A Little Liveliness.

The electrical papers continue rather chagrined over the fact that they cannot in these times argue the electricity supply industry into doing what it would not do in peace times—establish a publicity organization on the scale and with an effectiveness equal to the British Commercial Gas Association. The electricity undertakings refuse for very good reasons to be raised in these hard times from their passive state. These are not days in which to try to develop business in electricity for domestic purposes at ½d. to 1d. per unit. Production and other expenses will not admit of it. There are the difficulties, too, regarding capital powers; and there is little or no spare cash in the lockers of most electricity undertakings. But all the same, certain electrical papers would like to see concerns in that position play a lunatic's part, and in current circumstances cultivate a money-losing business. Financial disability and the price of goods have not so much weight with these imprudent monitors as the fact that at any cost they would like to see the gas people opposed. The argument now runs thus: Before the war domestic electrification was urged on the ground that there was great economy in it (whether or not the argument was justified is not regarded as a matter of importance); now, though the price of energy has gone up from 10 to 25 per cent., the argument for domestic electrification has been shifted on to the shoulders of the domestic servant. She is, with the high price of food, an expensive creature to keep in the home; she wants a higher salary at a time when the householder can least afford it; and she foresakes the home for munition service. To provide for the servantless difficulty, domestic electrification at the much higher costs is said to be the finest thing in the world. If this is true now, then it means that, for her patriotic work, the domestic servant is to be largely thrown out of employment after the war. She is a superfluity where the marvels of electrical operation are applied. Answer to the wild pleadings for an equivalent of the "B.C.G.A." is made by the Grimsby Electricity Committee, who, in order to save capital expenditure, are refusing to connect new consumers, and only motors on the time-switch and restricted-hour systems. Occasionally, however, there are flickering signs of an attempt to pass from the passive to the active condition. The "Daily Mail" for the 19th ult. had a column article (obviously an advertisement), in which an electrical consumer expatiated on how nicely meals are cooked by electrical means; but the disinterestedness of the article was entirely spoilt by the mention of the cost of the electrical appliances, and of that old fiction as to "the loss in the weight of meat cooked electrically" being "only a fraction of that involved by gas or coal cooking." The public must be heartily sick of this impudent declaration when equal temperatures and modern methods are employed. Then we see that the Brighton Corporation Electricity Department has been indulging in a sort of doll's flat—it was called a servantless flat—at a local Patriotic Housekeeping Exhibition. Commenting on this, the "Electrician" remarks: "At a time when the British Commercial Gas Association is trumpeting its wares throughout the length and breadth of the land, some voice should be raised on behalf of electrical apparatus, if only in the interests of national economy." There is not much room to "raise one's voice" in a space 30 ft. by 18 ft. However, it strikes us as being a queer way of securing "national economy" by wasting the thermal energy of coal to obtain a small amount of thermal energy in the form of electricity. A better way is to carbonize the coal in retorts, obtain gas, coke, tar, ammoniacal liquor, and sulphur for making sulphuric acid, with ultimately numerous important derivatives from the tar.

THE PAUCITY OF SCIENTIFIC RESEARCH.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

(*Concluded from p. 271.*)

Although the present crisis has led to an examination of the position from new points of view, or thrown fresh light upon old ideas, very little has been put forward that is not foreshadowed to some extent by leading workers in our industry, particularly in presidential addresses. The need for systematic and central controlled research is no novelty to gas engineers who have read the "Transactions" of their Institution; and the only obstacle to the adequate establishment of such, at any time within the last ten years, has been the apathy or indifference on the part of those who hold the purse strings, as instanced by the small amount contributed by gas undertakings, as distinct from members, to the funds of our Institution. The appointment of special committees was a practical attempt to fill the bill; and the work done by such committees was fairly close to lines of centrally controlled research. Those who are inclined to criticize this work should bear in mind the disadvantages under which it was conducted. Any general interest, to say nothing of active support or co-operation, was confined to a very small percentage of the total number of members. The majority were quite indifferent. The funds at the disposal of the Council were both inadequate and unworthy of the magnitude and importance of the issues involved; and research work on the cheap is open to the same objections that apply to ordinary purchasing upon similar lines. These endeavours are interesting as going to prove that paucity in research is not necessarily due to paucity of ability. If four or six engineers, all in active practice, can contrive to get up reports, such as those which appear in the "Transactions," as a spare-time job, and with lack of suitable material, they could, under more fortunate environment, with sufficient plant, proper assistance for control of detail, and no risk of being compelled to curtail their operations or stop them entirely at an incomplete stage because the funds were running out, do all that can be required in the way of research. As hitherto conducted, the work has been a hybrid between individual and collective effort; and as such it has embodied many of the disadvantages peculiar to the first named.

A Central Control Committee would have a complete reference library at its disposal, and therefore be in a position to plan and conduct investigation under the advantage of a full knowledge in respect to previous work on similar lines. As much is rarely practicable with engineers in active practice; and the entire absence of information of this character is sometimes conspicuous in patent specifications. If always available, it would be the means of saving much waste of money in stamps and fees. Even if a private individual has access to a complete library, he has not the leisure necessary to the carrying out of a full search. The Society of Chemical Industry make an excellent attempt to meet requirements of this description by the publication of a decennial index, the Institution of Gas Engineers has issued a comprehensive index up to date, the "Engineering Magazine" publishes a general technical index; and these examples are worthy of extension. Here a word may be said about "titles." The authors of papers or communications to technical societies do not always remember that the heading will eventually come into the hands of a compiler of the index, to be pigeonholed by him for permanent record; and therefore it should always represent accurately the gist of the text. The late Sir George Livesey was one of the best composers of titles to be met with in gas engineering literature. A doubled-barrelled heading suggests that both title and text might with advantage be separated into two, or perhaps more, distincts parts. An explanatory title may be far from what it would claim to be, and may actually assist in the passing of valuable material into the limbo of a wrong letter in the alphabet. Authors may well consider the desirability of reducing the editorial labours of the compiler, in the shape of recasting the title in order to find the most appropriate place for it. A double title, which is a different thing from a "double-barrelled" one, comprising the general and the particular, so far from being an objection, is in many cases an advantage.

A complete library should not either omit or curtail a record of failures, many of which are as honourable and as useful as successes. Failure or success in a commercial sense does not necessarily indicate the technical value of the work. There is a disposition to minimize or hush-up the investigations that have not resulted in a splutter, or, in a financial sense, have proved unfortunate. As a consequence, elderly gas engineers can recall more than one instance of the resuscitation of schemes that are seductive on paper but impossible in practice; the result being a large waste of money and time on each occasion. An apparent failure may also be remembered that has proved the stepping stone to a substantial success.

Another hindrance to the progress of research and invention is the difficulty of securing fair remuneration and protection from piracy. Unless the inventor possesses the necessary capital, leisure, and ability—the power of inventing, as also of marketing the invention to the full advantage, are rarely associated in one individual—he is at the mercy of that numerous body who find it more remunerative, and less laborious, to exploit the work of others than to originate on their own account. The existing practice in respect to the exploiting of invention has an unfortunate effect in more ways than one; and the company promoter is a hindrance to real progress. The fortunes of the incandescent mantle are a case in point. The delay in getting a reasonably cheap mantle on the market affected many interests apart from those immediately concerned. The promoter who has really done nothing makes hundreds, where the inventor, who has at considerable expense carried out all the spade work, receives units or less, and is more interested in heavy royalties and high prices for himself than in anything else; and these hold out a challenge to unscrupulous imitators. If the inventor sells right out, he saves much worry and the risk of financial misfortune; but he finds difficulty in getting anything approaching an adequate price. He is left in undisturbed enjoyment of a notion that has no money in it; but a valuable idea runs considerable risk of displacement by a colourable imitation, cunningly devised and equipped for the sole purpose of driving a coach-and-four through any protection afforded by the Patent Office.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

General Meeting at Tottenham.

The Fifty-Third General Meeting of the Association was held last Friday, at Tottenham. The members and a number of friends assembled at the splendid offices of the Tottenham District Light, Heat, and Power Company, where they were received by the PRESIDENT (Mr. A. E. Broadberry, M.Inst.C.E., the Engineer and General Manager of the Company). The programme for the day was a full one; and the President, punctilious in all things, had the members seated in the Board room for their business meeting soon after 11.30.

WELCOME AND THE ABSENCE OF SIR CORBET WOODALL.

The PRESIDENT, on taking the chair, said, on behalf of the Chairman and Directors of the Tottenham Light, Heat, and Power Company, he offered to all members and visitors a hearty welcome to Tottenham. He was pleased to say that Mr. James Randall, one of the Directors, was with them; and the Deputy-Chairman, the Right Hon. Sir Daniel Ford Goddard, M.P., would be with them at a later hour—in fact, he hoped he would be there in time to preside at lunch. Mr. Henry Woodall, another of the Directors, wrote to the effect that only urgent public duty prevented him being with them. He would have much enjoyed meeting the members of the Association, and in his "humble way," assisting the President to welcome them to Tottenham. The letter proceeded: "I feel sure they will find, as they would expect to do in their President's works, much to interest them." Last, but not least, he (the President) would like to mention that Sir Corbet Woodall, the Chairman of the Company, would undoubtedly have been with them had he been able to do so. But he (the President) expected that many of the members knew Sir Corbet was at present at Torquay. He was far from well; and it was utterly impossible for him to have come up for the meeting.

MINUTES CONFIRMED.

The HON. SECRETARY (Mr. F. M. Paternoster, of Felixstowe) read the minutes of the last meeting; and they were confirmed.

THE INSTITUTION BENEVOLENT FUND.

The HON. SECRETARY read a letter from the Hon. Secretary of the Institution Benevolent Fund (Mr. Walter T. Dunn) calling attention to the deficit on the fund, and commending this fact to the favourable consideration of the Association.

The PRESIDENT said the Committee had had the letter under consideration; and they recommended that a sum of five guineas should be subscribed by the Association to the fund. He should like to say that, from personal knowledge, he was aware that the fund was doing a very great deal of good work; and in order to be able to proceed with this, it was necessary they should be well supplied with money. Not only should he be glad to see the Association making a donation, but he appealed to every member of the Association, if not already subscribing to the fund, to give the matter consideration.

Mr. J. T. JOLLIFFE (Ipswich) said one did not like to go against the well-considered decision of the Committee; but he should like to propose, if he might do so, that the Association subscribe ten guineas, instead of five. They had a balance in hand of £26. It was only two or three years ago they were on the debit side; and if they could increase their balance from nothing to £26 in so short a time, he believed they could afford to give ten guineas to the desirable object in view.

Mr. J. H. TROUGHTON (Newmarket) seconded Mr. Jolliffe's proposition. It needed no words to commend this, after what the President had said as to the Benevolent Fund doing such great and good work. There would be further claims upon the fund after the war; and there was no doubt the additional sum would be much needed. Mr. Davis knew all about the finances; and he would support him in what he had said.

Mr. J. DAVIS (Gravesend) said he quite agreed with what had been said by Mr. Jolliffe and Mr. Troughton. It was true they had a balance of £26 in hand; but probably next year, their Secretary would tell them the expenses would be considerably more, and that he would have difficulty in making the subscriptions equal the amount of the demands upon their revenue. At the same time, he (Mr. Davis) had pleasure in supporting the proposal as to the ten guineas.

The PRESIDENT remarked that what led the Committee to recommend five guineas was that of the £26, which was the balance in hand, £24 was brought into the year; so that there was an increase in the balance during the year of less than £3. But he was quite sure the Committee would be gratified at the generous view the members were taking.

The proposal that ten guineas be handed over to the fund was unanimously carried.

Mr. WALTER T. DUNN (Hon. Secretary of the Benevolent Fund) observed that the Committee of the Fund would greatly appreciate the vote. At their last meeting, they had before them the reports of the preceding year; and they felt that still more money would be wanted.

NEW MEMBERS.

The HON. SECRETARY next presented the names of candidates for membership, as approved by the Committee. They were: Mr. Samuel Carpenter (Cromer), Mr. Leonard Birchmore (Louth, Lincs.), Mr. Clarence Leslie Godwin (Woodbridge), Mr. Henry J. Randall (Yorktown and Blackwater), and Mr. Charles Stuart Shapley (Southend).

Moved by Mr. J. DAVIS, seconded by Mr. W. B. FARQUHAR (Ilford), the candidates for membership were duly elected.

DEPARTED.

The PRESIDENT said it was his sad duty to announce the death of one of their members, Mr. E. Topley, of Tottenham. The meeting, he was sure, would approve of the action taken by the Committee in asking Mr. Paternoster to write a letter of sympathy to the relatives. This he had at once done; and it had been acknowledged.

REPORT AND BALANCE-SHEET.

The PRESIDENT next presented the annual report of the Committee and the balance-sheet. The former reviewed the proceedings of the year, and concluded with the following paragraphs:

The year commenced with a membership of 138. During the year three new members were elected, four resigned, and five terminated their connection with the Association under Rule 19. The Committee have with regret to announce the death of one member—Mr. John Carter, of Lincoln. The membership at the end of the year was 131.

The accounts show a balance in the Hon. Treasurer's hands at the end of the year of £26 11s. 3d. The subscriptions received amounted to £61 18s. 6d., and the expenditure to £59 6s. 10d. The balance brought forward from last year was £23 19s. 7d.

The Commercial Sections have met as usual; and a record of their most useful work, as given in their annual reports, has been sent to every member of the Association. Under the present abnormal conditions, the Committee feel that they cannot too strongly impress upon the members the importance and usefulness of these sections, and trust that those who have not yet joined them will seriously consider whether they are doing their duty to their Companies and the industry generally by refraining from helping in this work which is producing such excellent results.

Mr. C. F. VEEVERS (Northfleet) moved, and Mr. H. R. WIMHURST (Bury St. Edmunds) seconded, the adoption of the report and balance-sheet.

This was agreed to.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Gentlemen,—My first words to you as President must naturally, and necessarily, be to thank you sincerely for having elected me to the position. It is the highest honour you could do me, and I assure you that I appreciate it greatly. I accepted the first step—namely, the Junior Vice-Presidency—with great willingness in 1913, hoping to be able to do useful work for the Association, and at the same time to obtain much personal enjoyment from a close and intimate acquaintance with the individual members. I fear, however, these hopes have not been realized. The war has given us all so much to do that perhaps it would have been better to have allowed the Association to remain altogether in abeyance, or to have treated my year as a "bye," in which case I should not have been placed, as I now am, in a quandary as to what to say in my Presidential Address.

The war dominates everything; and all the interests of our industry change so rapidly from day to day that anything said to-day may be out of date to-morrow, and, in the case of a great many things, local conditions, rather than general ones, have to govern and dominate our procedure. It is impossible, therefore, for me to follow the usual custom of reviewing all the various questions connected with our industry. We are so intimately connected with the war that never was there a time when silence was more golden. On most subjects, although perhaps they are not absolutely forbidden for discussion, it would be bad policy to speak too openly. The Ministry of Munitions knows very well the value of the work we are doing.

THE COAL QUESTION.—BOARD OF TRADE CIRCULAR.

There is one subject, however—that of coal supply—which, to my mind, is so important that, although laying it bare in public may be inconvenient to some of the authorities, I propose not only to take the risk, but to embrace this opportunity of giving serious and solemn public warning of what the result of the present official attitude will be. Next winter, as coal supplies are now being treated, we shall experience an absolute coal famine at home. The certainty of it is so absolute that I propose to confine nearly all my remarks to you to-day to this one subject. It is a danger that is preventable; and it is with the object of doing our part to avoid the evil that I am making these remarks.

Coal has always been exported from this country in huge quantities, and even last year, with the restricted production, one ton out of every six raised from the pits was sent out of the country. This the Board of Trade want to increase as much as possible. In a recent announcement from that office we are told that 43½ million tons were exported last year, 23 millions of which went to the Allies, 17 millions to the Neutrals, and we are left wondering where the other 3½ million tons went if neither to the Allies nor

to Neutrals. You have no doubt all seen the latest circular on the subject from the Board of Trade, dated May 1. [The circular referred to appeared in the "JOURNAL" last week, p. 288.]

The enclosure to which reference is made in the circular, but which I need not now repeat, still further emphasizes the need for coal for export. There can be no doubt in our minds, nor in the mind of anyone, as to the need of coal for export after the home requirements are satisfied; but surely the suggestion contained in the circular is about the most futile way to set about obtaining coal for export that could well be conceived. It shows a colossal lack of appreciation of the situation. It does not state at what intervals the inspectors are to pay their visits; but "as often as possible" would apparently mean about once a fortnight.

You will excuse me, I know, if, in criticizing these matters, I use Tottenham by way of an illustration. In the Tottenham area we have 22,500 ordinary meters, and 58,000 coin meter consumers. I wonder whether the Board of Trade calculated how many inspectors would be required to call once a fortnight in such a case. A considerable amount of time would be involved in each call, as, in addition to stopping to read the meter and work out what a 10 per cent. reduction on the corresponding period would amount to (no corresponding period would exist, and would have to be estimated), the inspector would have to argue it with the consumer, and issue and record the notice reminding them of the recommendation, &c. Forty calls a day would be the limit for any man. This represents 2000 days of inspectors' work for each complete inspection. If the calls are to be made once a fortnight —that is, twelve working days—it would require 166 inspectors to do the work. This equals a sixth of our total labour. Surely they would be far better employed in mining coals, to increase the supply, rather than waste their time trying vainly to curtail its use. Probably they would not be suitable for mining; but they could be used for the release from the Colours of trained men who are at present fighting. I may remark incidentally that a great deal might be done to improve matters if the Government would only make all miners give a better output. It may be said that once a fortnight was not intended; but as over 70 per cent. of the Tottenham consumers are at present visited every six weeks, anything less often could scarcely be called "as often as possible." Even if such expensive inspections were made, is the consumer likely to obey? I certainly doubt it.

GAS OIL SCARCITY.

Another important matter on which the Board of Trade have failed absolutely to appreciate the position is the matter of gas oil. They appear to have lost sight of the fact that the Government commandeered practically all tank-steamers. Very little gas oil is coming into the country, although there is plenty available in America. Carburetted water gas cannot therefore be made, and more coal must be used to replace the carburetted water gas which would normally be manufactured. I find by reference to the last belated issue of the Board of Trade returns that 27,141 million cubic feet of carburetted water gas were produced in the United Kingdom in the twelve months 1912-13. Calculating on 12,000 feet per ton, it will require 2,262,000 tons of coal to make sufficient coal gas to replace this quantity. It will be noticed that I have placed the efficiency per ton somewhat low; but I expect all of you are aware that, owing to lack of labour, the quality of coal now generally being received at gas-works is notoriously far below normal standard. I know that some districts have been so affected by the war that they are already down considerably in their gas sold. The Board of Trade requirement, however, would still have to be applied to them; and although they have already been hard hit, it would require them to be hit harder.

In the case of Tottenham, we have an enormously increased demand, due to the requirements for munition work. I estimate that 1½ million cubic feet of gas per day are being used entirely on war work. Without this we should probably be experiencing a decrease of about half-a-million cubic feet a day; but as it is, a large increase has to be provided for. Our position is that during the twelve months ended April 30, 1916, we sent out 2709 million feet of gas; the coal gas being made from 140,390 tons of coal. Allowing for the increase and for the use of all the oil we have available for the manufacture of carburetted water gas at the rate of 2 gallons per 1000 cubic feet, we shall require 224,000 tons of coal to produce the remaining quantity of gas needed. Therefore, instead of a 10 per cent. reduction in coal, we shall want about 60 per cent. increase, or, taking it the other way, to reduce our coal consumption by 10 per cent., after allowing for the full possible quantity of water gas, the reduced quantity of coal will necessitate our cutting down our output from 2709 million to 1877 million cubic feet. This is a 33 per cent. reduction in gas consumption on last year, or 40 per cent. on what is likely to be required with our present rate of increase. It is impossible for the Board of Trade request to produce this result. If it were produced, we should be put to enormous financial loss during the time of restriction, and our business would be permanently injured as a further result. Tottenham's advertising motto for a long time has been "Use More Gas." In view of existing difficulties, we have now ceased that advertisement. Our show-rooms are superfluous, and, in addition to this effect on general gas supply, any restriction in the sale of gas will also injure the business of apparatus manufacturers.

It seems strange that, while quite recently the Government issued a circular urging the use of gas as the only means of producing the necessary materials for high explosives, the Board of Trade should issue a circular advocating the disuse of gas. Our industry deserved very different treatment. It had the right to expect that steps would be taken to maintain the supply of coals for the manufacture of gas, if only for the sake of munitions. The steps taken have certainly not been properly effective. When an inconvenient subject had to be avoided, there has been a hoary old party subterfuge to appoint a Committee. On the subject of coals, we have had Committees enough and to spare appointed. Their functions are uncertain, their methods bewildering, and their effect negative or worse. Here is a partial list of these Committees: Central Coal and Coke Supplies Committee, Board of Trade Railway Department (Coal), Admiralty Coasting Trade Office, Railway Executive Committee, London Coal Supply Advisory Committee, and some eleven District Coal and Coke Supplies Committees.

Time is wasted in referring matters from one Committee to another, and months fly by with no good results obtained. What really is wanted for the successful prosecution of the war is the abolition of all these Committees and the setting-up of a Gas Coal Department of the Ministry of Munitions, with a man at its head who understands the situation, who can grasp it, and enforce the necessary action. He should be entrusted with full power to compel miners to work, suppliers to deliver coals in accordance with their contract, and colliery owners to respect the Price of Coal (Limitation) Act. That the miners are not so working is a notorious fact; that coals are not delivered is shown by the depleted stocks in all gas-works; and that the collieries scorn, deride, flout, and defy the Act is easy of proof.

Once more I will take Tottenham as an illustration. Stocks at the end of each month last year and this were:

1915.		September	41,039
January	3,750	October	41,264
February	2,976	November	38,666
March	3,705	December	33,718
April	6,481	1916.	
May	13,038	January	26,405
June	20,998	February	26,743
July	29,106	March	12,958
August	37,031	April	6,855

It will be seen that stocks have fallen recently by an average of 6000 tons per month, and only a miracle, or a more sensible Government organization, can save us from running completely out. That we made ample provision for the present is shown by the fact that at the end of April we had over 49,000 tons of arrears of contracts due to us.

As regards the future, we are trying to renew our contracts. Some collieries, however, altogether refuse to renew, others are cutting-down the tonnage, and as for price, if we attempted to seek protection under the Act, we should get practically no coal at all. I record, however, with satisfaction, that as regards price there is one notable exception, and the price for the renewal is based absolutely on the 4s. per ton allowed by the Act. In almost all cases we are being asked about 18s. per ton at the pit for Yorkshire coal; and it goes without saying that it is impossible to show corresponding contracts in 1914 at 14s. a ton. I do not complain, however, so much of the price as the withholding of supplies. One stipulation made by many collieries is really amazing—viz., that, while asking the buyer to renounce his right under the Act, they stipulate that any increase which may be allowed by the Board of Trade to the 4s. is to be added to the new contract price.

From what I have said, it will be plain to members who are all expert on the subject, that the supply of gas is undoubtedly going to fail during the coming winter in nearly all towns throughout the country. Gas lighting, gas-fires, gas cooking, water heating, power in factories, industrial furnaces, and countless operations on which depend the continuous and rapid production of shells, guns, and other munition supplies will be brought to a standstill. Is it realized by "the powers that be" that, in the result, our Armies at the front may run short of their proper equipment; and do they think of the responsibility which will rest on them through lack of proper organization of coal supplies for home purposes? It is not only the troops who would have to run risks in the case of a failure in the gas supply. The dangers connected with such an inconvenient occurrence are far greater than all the dangers likely to come from Zeppelin raids and German bombardments of our coast. A great deal would no doubt be given to rid ourselves of these raids; and it is to be hoped that the suggestion of risking worse harm to ourselves for the sake of exporting coal will not be persisted in.

THE DAYLIGHT SAVING BILL.

I want it to be clear that I am not opposed to the reduction in gas used. By all means let us economize in everything, including gas; but what I want to make clear is that no economy is likely to ensue from the Board of Trade suggestion; and it follows that we must have coals to maintain the supply of gas. One suggested economy is far more practicable; and although what I am about to say may seem strange to some members, and it would have surprised me two years ago to have heard any gas man (or electric man for that matter) support the Daylight Saving Bill, I am prepared to say that at the present time it is a sensible economy —one easy of testing, and one that is almost certain of success.

THE POSITION OF THE INSTITUTION.

Before I close, I would like to touch on one other subject. There is an old saying that "Too many cooks spoil the broth."

This is very true. But I would like to add "Lord help the broth if someone asks the housemaid, the kitchen-maid, and the gardener to take a hand as well."

I have been sorry to notice a large tendency recently on the part of some of our members to appeal for help to the wrong quarter. Our Association is affiliated to the Institution of Gas Engineers, and we ought loyally to support it. Doubtless changes in its constitution—and radical changes—must shortly be made to render it fit for the altered needs and modern conditions of the industry; but now is not, in my opinion, the right time to discuss them. The Institution has been hampered by many of its members doing so much voluntary work for the country. It has nevertheless done a great deal of good work; and if all the efforts to influence the Government had been centralized through it, I believe much better work might have been done. Anyway, the authorities would have known where to look for guidance; but, as I have already mentioned, unfortunately a practice is growing up of writing for advice on all subjects, frequently in circular form, to all our different organizations; and if all these organizations make representations to the Government, neither they nor anyone else knows which is the official organization. The Government at the present time wants guidance in matters relating to gas supply; and I strongly urge all the members to support the authority of the Institution as the representative organization, and to refer all matters to it, leaving it to pass them on, if desirable, to other bodies.

Finally, I would say if the country can win this war by producing failure in the gas supply, by stopping munition works, and sacrificing explosive materials, let us be told so by someone who knows, and let us then be given an opportunity to take our place at the front, where, I am sure, many of us would sooner be. But if the war cannot be so won, if gas is as essential as we believe it to be, in the name of all that is sensible let us be properly supported in our less glorious, but equally important duty of carrying on our work successfully. For that support I look to the Ministry of Munitions.

Benzol and Toluol Extraction.

At the conclusion of the address,

The President said he would take this opportunity of reading a letter that he had received from Mr. Halford, of the Explosives Supplies Department of the Ministry of Munitions.

34, *Old Queen Street, S.W.*,
May 10, 1916.

Dear Mr. Broadberry,—You have always been so ready to co-operate with this department in its efforts to obtain raw materials for explosives from gas manufacture, that Lord Moulton feels sure you will take the opportunity of stimulating interest in this connection at the meeting of the Eastern Counties Gas Managers' Association on Friday.

The requirements of such materials continue to grow; and it is of the utmost importance that every effort should be made to procure the maximum production of benzol and toluol. It is specially to be noted that many undertakings have now shown an admirable spirit in installing oil-washing plants entirely on their own account, and even small works, possessing ample scrubbing apparatus, are finding that money expended on a crude benzol plant yields an excellent return.

If your own plant is rather too large for an opinion to be formed of the adaptability of the process to smaller works, a visit paid to either Norwich or Wombwell Gas-Works would give an indication of it on a smaller scale.

Now that the necessity of utilizing the national resources for the prosecution of the war to the fullest extent in every direction is so thoroughly appreciated, and by no section more than the gas industry, it will be somewhat of a disappointment if your meeting on Friday does not yield important practical results.—Yours faithfully,

F. L. Halford.

These important practical results (continued the President) could only be achieved by those members who were not already washing gas by oil; and such members should see whether it was not possible for them to do so. Mr. Halford told him the other day that any gas-works using more than 6000 tons of coal per annum ought to be able to wash its gas by oil for the extraction of benzol and toluol. If any members using this quantity of coal or more were not already extracting all their benzol and toluol, he suggested that they should put themselves into communication with Mr. Halford at the address given at the head of his letter; and he was quite sure that gentleman would be able to advise them as to how to set about it, and be able to convince them that, by undertaking such work, not only would they be fulfilling a great national duty, but that it would be profitable to the concern.

Mr. Thomas Glover (Norwich) said he had much pleasure in proposing a hearty vote of thanks to the President for his admirable and stirring address. In Mr. Broadberry they had a strong man; and he thought the Association were to be congratulated on having secured him for the presidency for this year. When Mr. Broadberry spoke, they expected to hear something; and they anticipated an address full of strength and virility. They had not been disappointed. He had confined himself very largely to a topic of great urgency; and they hoped his words would carry much weight in the right direction. As to the President's rather gloomy prophecy, he (Mr. Glover) thought it was probable that he would not be prepared to swear by it. But he had thrown out an important warning; and they believed that the words would have weight in the right place. There was real need for these words. Probably many of those present knew that, in connection with a number of collieries in Yorkshire, the Government or the Board of Trade last year stepped in, and said: "You must convert all your nut coal into coke." They quite ignored the obligations of the collieries to the gas undertakings that were trading with these collieries; and only under great pressure afterwards, in his own case, was he able to get some of the coal released. It was very much wanted. So far he had been supporting what the President had been telling them. He (Mr. Glover) was also glad they were meeting in Tottenham, because Mr. Broadberry had taken such an important part in the question of benzene and toluol extraction; and they were to see something of his practice, and hear something of his experiences, during their visit to the works in the afternoon. Mr. Halford in his letter suggested that, if the scale of the operations were too large for any of the members to be convinced that they were applicable to their circumstances, they might go to Wombwell or to Norwich. But Wombwell was a long way to go. He ventured to say that Norwich had greater claims upon the members; and he was going to invite as many as cared to go there on May 25 to see the oil-washing and distilling plant. He hoped, too, by that time to be able to formulate some little scheme for consideration, whereby it might be possible for the oil-washing to be done, without having to distil—that was to say, for the oil washing to be done in a scrubber or some form of washer at the works, then the oil be sent away to a continuous distilling arrangement, and from the distillery the oil be returned to the oil-washing plant. This would be a continuous round. He thought it was possible for the smaller works to so arrange that they could receive washing oil, and return it to a larger works to be distilled. This was what he was trying to do, because he did not think there was much hope of many works being in a position to put in both an oil-washing plant and a distilling plant. It might be possible; but they had not arrived at that stage yet. He had found it possible to supply washing oil to a works using only 600 tons of coal per annum. They were extracting the benzol and toluol from their gas; and he was taking from them the saturated oil, and giving them so much a barrel for it. This paid the companies well. The manager told him that the stripped gas suited incandescent burners better than the rich gas he was making before applying the oil-stripping process. He had, however, digressed from the resolution that he was asked to propose, which was a vote of thanks to the President for his address. He had great pleasure in doing so; and he was sure it would be received with hearty approval.

Mr. C. G. Grimwood (Sudbury) seconded the proposition.

Mr. J. H. Troughton (Newmarket) said he should like to draw attention to one very important factor in regard to the matter referred to in the President's address. He did not think it would be considered that he was touching on anything of a political nature when he said they ought, and the authorities ought, to take into consideration the question of raising coal sufficient for their requirements. In his address, Mr. Broadberry did not mention the question of the Miners Eight Hours Act, which undoubtedly restricted the output of coal. It did seem to him in these times of national stress—when most people, including gas men, were doing the best they could in the country's interests in the prosecution of the war—very anomalous that the miners should be restricted by anything which tended to reduce the output of coal. It appeared to him that the powers that be ought to have their attention drawn to this matter of suspending the Act in question with the view of enabling an increase in the output of coal. The question was one for the Home Office; and that Department should have its attention drawn to the fact that so much in the way of providing munitions of war depended upon the gas industry being supplied with an adequate amount of coal. He thought that they as an Association ought to make representations to the Home Office.

The motion was heartily adopted.

The President thanked the members very much for their vote of thanks. The address, as Mr. Glover suggested, was confined practically to one subject, because of its extreme importance. He did not, however, want the members to think that he was an alarmist in this matter. He said in the address that it was a danger which was preventable. So it was with proper organization. Unless matters were properly organized, it was absolutely certain that the gas supply in nearly every town throughout the country was going to fail next winter. It was no use for either the Government or themselves shutting their eyes to the fact. If the work of gas supply was to be carried on successfully next winter, they must have proper support from the Government. The absence of gas oil was going to make a tremendous difference in the demand for coal. Time was flying rapidly; and next winter would be here before any Government Department, except the Ministry of Munitions, could be wakened to the fact that a war was going on. [Laughter.] Regarding the Miners Eight Hours Act, the Government had been requested time after time to suspend it; but the miners' representatives were opposed to it. Now the miners only worked about four days out of seven. Unless some official in a department of the Ministry of Munitions was appointed, as he suggested in the address, with power to make the miners work, he was afraid there was little hope of getting from them the coal that was required. According to the Board of Trade returns, there was only a little over 16 million tons of coal used per annum for the manufacture of gas by statutory concerns; and the oil employed for carburetted water gas represented about another 2¼ million tons of coal. Surely it was the duty of the gas industry to see that this extra quantity was reserved for it rather than that it should be exported. If the coal was not reserved for the industry, then gas making would be largely stopped, and so would be the supplies of munitions for their Army and Navy.

The Control Book.

Mr. J. Terrace (Grimsby) read a paper on the above subject. The text of the contribution, with a report of the discussion, appears elsewhere in this issue—pp. 331-5.

Election of Office-Bearers.

The President proposed the election of Mr. Terrace as President for the ensuing year. In doing so, he said he had known Mr. Terrace for a great many years, and had worked in close association with him in Tottenham for about eight years. During that time they formed not only a very close acquaintance, but a very intimate friendship, which, he hoped, would last for the remainder of their lives.

Mr. H. G. Ruggles (Leighton Buzzard) seconded the motion, which was heartily agreed to.

Mr. Terrace thanked the members very much for the honour they had conferred upon him.

Moved by Mr. W. Townsend (Colchester), and seconded by Mr. E. W. Smith (Chelmsford), Mr. J. H. Brearley was elected Senior Vice-President.

Mr. Brearley having responded,

On the proposition of Mr. T. A. Guyatt (Ely), seconded by Mr. J. H. Troughton (Newmarket), Mr. H. R. Wimhurst (Bury St. Edmunds) was elected Junior Vice-President.

Mr. Wimhurst acknowledged the honour.

The Hon. Secretary and Treasurer (Mr. F. M. Paternoster) was re-elected on the motion of Mr. Terrace, seconded by Mr. H. Green (Stamford).

Moved by Mr. John Barton (Peterborough), and seconded by Mr. F. A. Last (Halstead) the Auditors (Messrs. W. Beale and W. Brown) were reappointed.

Mr. H. Wimhurst (Sleaford) proposed, and Mr. H. Duesbury (Hertford) seconded, the election of Mr. W. Townsend as a member of the Committee.

Moved by Mr. J. T. Jolliffe (Ipswich), and seconded by Mr. G. R. Casterton (Melton Mowbray), Mr. John Barton was also elected a member of the Committee.

Place of Next Meeting.

The members concurred in the view of the President, that the place of next meeting should be left to the Committee to decide.

Vote of Thanks.

On the proposition of Mr. F. W. Cross (Lea Bridge), seconded by Mr. A. L. Clark (Maldon), a hearty vote of thanks was passed to the President, officers, and Committee for their services during the year.

A LUNCHEON AND A PRESENTATION.

At the close of the business meeting, the members and friends, to about ninety all told, were entertained at luncheon by the Chairman (Sir Corbet Woodall, D.Sc.) and the Directors of the Tottenham Light, Heat, and Power Company. In the absence of Sir Corbet, through the regrettable cause of his ill-health, the Deputy-Chairman of the Company, the Right Hon. Sir Daniel Ford Goddard, M.P., presided.

After luncheon, the loyal toast was honoured; and then

The Right Hon. Sir Daniel Ford Goddard said he was in his position that day simply as a stop-gap, because the Chairman of the Company unfortunately was not well enough to be present as he (Sir Daniel) was sure—speaking of a man whom he had known for a long number of years—he would otherwise have been to welcome the Eastern Counties Gas Managers' Association. He was going to propose a toast which he could give from several sides, because he was, speaking personally, in sympathy with all men engaged in the gas industry. It was not his first appearance at a meeting of an Association of Gas Managers, because, more than forty years ago, he entered the service of a gas company at the lower stages, and worked his way up. His toast was "The Eastern Counties Gas Managers' Association, and Success Thereto," and with it he coupled the name of the President (Mr. A. E. Broadberry). He (Sir Daniel) had not belonged to a good many similar Associations without knowing the value of them; and in these war times, they were more valuable than in ordinary times, because, speaking with knowledge of the subject, gas undertakings had never been in a more critical or difficult position than to-day, owing to the war. The war affected gas undertakings in many ways—some were not, he thought, bad ways; but some were very difficult. The work of a gas manager was never finished. There was always something else to be done; there was no finality (he spoke from experience), either in point of the work, or in point of the results which the gas manager had to produce. No sooner did he think he had reached the acme of success, than he found somebody was doing better than he. Then he had to see why it was, and how he could improve his position. This was his view of the work of the gas manager; and it at once showed the difficulty of the position, and the fascination of it—the difficulty of overcoming those things that stood in the way of getting the best results, and the fascination of always being on the stretch to know what could be done next in the interests of the gas undertaking. By these meetings of gas managers from different parts of the country, communication was made, in a friendly and brotherly spirit, as to what difficulties there had been, and how they had been surmounted; and he could conceive of no better use that such Associations could be put to than to try to help everybody to meet his present and extraordinary difficulties. He had been out of the gas-making business for a good many years; but he could not help making observation of how remarkable had been the changes since then. Twenty years ago, he should have known all the gas managers in the Eastern Counties; now he was bound to confess, with all humility, that he saw before him a great many gentlemen whose faces he did not know. In the matter of processes, too, there was always something fresh to engage attention. Who, for instance, would have dreamed twenty, ten, or even five years ago, that gas companies would to-day be engaged in making explosives as part of their industry. Who would ever have dreamed that a Government Department would have come down to the gas undertakings, and said: "You must use all your surplus power, methods, and machinery, for making shells." This was one of the fresh phases that had come over the industry. The engineers and managers of gas-works had taken up these things, and had carried them out with the greatest faithfulness, and he was sure with the greatest success. He heard only that morning that so energetic had been the engineers of gas undertakings to help the Ministry of Munitions in preparing shells that the order had gone forth that they were not to make any more of a certain sort, because they had made more than was necessary. This implied that they had got over the difficulty of not having enough munitions with which to carry on the war. In meeting that day the members of the Association, he most heartily wished them every success in their multifarious undertakings. [Applause.]

Presentation to Mr. Joseph Davis.

The President, in acknowledging the toast on behalf of the members, said they were proud to feel that their work as an Association was appreciated by their individual Boards of Directors and Committees. Sir Daniel had come down to Tottenham that afternoon so as to be able to preside at the luncheon; and he was sure the members were all very grateful to him for having separated himself from his parliamentary duties so as to be with them. Their work as engineers and managers could not be done as it was done if they had not the kind encouragement that they received from such Directors as Sir Daniel Goddard and his colleagues. Proceeding, he said that in an Association of this kind, they were largely dependent upon the Hon. Secretary; and they all felt they owed something more than a mere vote of thanks to an Hon. Secretary who, after years of devoted work, felt called upon to retire. He was making these observations, because he expected most of those present knew that, in accordance with the expressed wish of several members of the Association, a testimonial had been subscribed for to show their esteem for their friend Mr. "Joe" Davis. He called him "Joe," because he was "Joe" to them all. He (Mr. Broadberry) thought that it was about five years ago when Mr. Guyatt gave up the secretaryship of the Association in order to become President; and the Association was then in a critical position for want of an Honorary Secretary. Mr. Davis very kindly stepped into the breach for one year; and he proved himself so useful as Hon. Secretary, and such a genial man, whom everyone absolutely loved, that they induced him to carry-on for another three years. At last, having sacrificed himself—and it must have been sacrifice to him to perform the work in the way it was done—he felt bound to retire; and a new Secretary was appointed—Mr. Paternoster. Now that Mr. Davis's work was finished in that office, it was felt that they ought to present him with some lasting token of their esteem; and he had pleasure in asking him to come forward and to accept from the members a silver tea and coffee service, as a token of their regard and affection for him personally, and of gratitude for the work that he had done for the Association. [Applause.]

Mr. Joseph Davis (who was enthusiastically received) said it came quite as a surprise to him a few days previously when he heard that something of this kind was to be done on this occasion. If he had heard of it in the early stages, he would have said that he had not served the Association in an official capacity for a long enough time to deserve such kindness from the members. Of course, he took up the office of Hon. Secretary on the understanding that it was to be for a short time only; but the work became so pleasurable to him, and he received so much help and kindness from the whole of the members, that it was proposed he should remain in the office for a time. However, at length, he felt that the day had arrived when he should give way to a younger member. He could not adequately express to the members his appreciation of the handsome present and testimonial. He added: Believe me, I shall look upon this tea and coffee service with a great deal of pride and pleasure; and it will be handed down in my family as a record of the friendship of colleagues whose regard I so much value. [Cheers.]

Mr. Terrace proposed "The Chairman and Directors of the Tottenham District Light, Heat, and Power Company." In the course of his remarks, he spoke of the great success that had attended the capable administration of the Company, and took the opportunity of thanking the Chairman and Directors for their generous welcome and hospitality.

The Right Hon. Sir Daniel Goddard replied on behalf of his colleagues and himself; and, in doing so, he referred to the impracticable things which were sometimes found in lengthy circulars from the Board of Trade. He was not against rightly-placed economy in anything; but he did not think the proposal of the B ard would much affect gas undertakings, in view of the relation of the consumption between 6 a.m. and 6 p.m. and 6 p.m. and 6 a m.

VISIT TO THE GAS-WORKS.

The New Section.

After luncheon, the members visited the gas-works of the Company, in which works are to be found, in striking form and variety, the impressions and materializations of the engineering talents of the President of the Association. Mr. Broadberry has transformed the works; they have grown and grown in extent and in their constituent parts. There were two features that particularly engaged the members on Friday afternoon, when they were conducted about the place by the President, the Assistant Engineer (Mr. J. Fisher), the Works Superintendent (Mr. R. Wardell), Mr. G. Warburton and Mr. P. C. Gardiner (Chemical

Department), and the General Foreman (Mr. H. P. Morley). These two features were the complete new section of works now under construction, and the oil-washing gas plant for the extraction of benzol and toluol, with the distillation plant attached. About the latter we cannot say anything, because it is considered best not to do so. But the new section of works is a different matter; and we can speak freely of it.

In the construction of the new section (which it is hoped to have ready in time for use next winter), the visitors took considerable interest. .It was seen that the steel framework for the retort-house is nearly complete; and the work of building the retorts, benches, and exterior walls is well in hand. The retorts are of the Woodall-Duckham vertical type; and there are two benches of seven settings with four large retorts in each setting. They are constructed to carbonize 364 tons of coal a day, from which it is expected to obtain 4½ million cubic feet of gas. A noteworthy feature of this part of the plant is that the retorts are to be heated by outside producers of the Kerpeley type, with moving grates and ash-extracting gear. The producers are designed to gasify coke breeze as well as unscreened coke from the retorts, and overhead hoppers are being provided to supply the producers with fuel.

The coal and coke handling plant and truck-tipping arrangements are being supplied by Messrs. Babcock and Wilcox; and each of the two gravity bucket conveyors is to deliver 100 tons of coal an hour. These conveyors run straight through under the retorts, and will be utilized for conveying the coke from the retort discharge chambers to a tipping tray conveyor, which will, in turn, deliver it to conveyors for storing it over the producers or in the main coke-hoppers as required. The coke delivered to the coke-hoppers will be screened on Norton screens into the four sizes recommended by the London Coke Committee, and further means for removing dust are being provided in the bagging and loading arrangements under the hoppers. The inconvenience of a breakdown of either of the main gravity bucket conveyors is being provided for by means of a traversing band conveyor between the coal-bunkers, so that either conveyor can deliver coal into either set of bunkers.

The outside producers will be supplied with steam saturated air, turbo blowers, and mechanical grates, and, in fact, all the coal and coke conveying plant (nearly 200 H.P.) will be electrically driven. For this purpose an extensive power house is in course of construction, equipped with two sets of Belliss and Morcom compound high-speed engines, direct coupled to 150 KW. direct current generators made by the Electric Construction Company. The engines and also the exhauster turbines will be run condensing, and Rees "Roturbo" condensers are being provided. On account of the shortage of clean water, the condensing water will be cooled in a cooling tower; motor driven centrifugal pumps with automatic control being supplied by the Pulsometer Engineering Company for circulating the water. The boilers are of the water-tube type, and together with fuel handling plant are being constructed by Messrs. Babcock and Wilcox. Hot water from the producer jackets will be used for feed water.

The treatment of the gas will be on the usual lines, with the exception that a washer is provided in the foul main with a four-way valve, whereby it can be used before or after the first condenser as found advisable. The exhausters are of the impeller type, driven by two-stage Curtis turbines, constructed by the British Thomson-Houston Company; and the turbines will run condensing. Livesey washers and centrifugal scrubbers, of what are now the usual type, are under construction.

Another novelty in this section will be the purifiers, which are to be overhead and constructed of reinforced concrete. Owing to the possibility of high pressures at some future time, they have been designed for a pressure of 250 lbs. per square foot, in addition to the weight of material; and this has proved to be a very different proposition to constructing them on the ground. The many advantages obtained by having them overhead will doubtless justify the extra cost; and it is confidently hoped that they will prove gas-tight—if so, they will mark a new departure in purifier construction.

As this section of the works is entirely separate from the older portion, a meter is being constructed by Messrs. Parkinson and W. & B. Cowan, Limited, and the gas, after being measured, will be delivered into the trunk main in the valve-house.

An important part of the extensions now in progress is the construction of a five-lift gasholder for 6½ million cubic feet. The tank for the holder was finished some time ago on land belonging to the Company on the east of the Great Eastern Railway, where, if the usual Tottenham increases continue, it will be necessary to construct an entirely new gas-works. Work on the holder itself is being held-up until prices, labour, and materials all approach normal conditions.

The plant and apparatus for washing the gas and the extraction of benzol and toluol, as we have already said, received the particular attention of the visitors. The special method of working, with its difficulties and advantages, was explained; but for obvious reasons it is not desirable to publish details either of plant or the results that have been obtained.

It was an enjoyable and instructive visit, which wound up with tea being served in a commodious tent on the lawn of Mr. Wardell's house adjoining the works. There the members bid adieu to their President; and many were the expressions to him of gratification over the pleasure that had been derived from the day's visit and the proceedings generally.

BRANDENBURG ASSOCIATION OF GAS, ELECTRICITY, AND WATER ENGINEERS.

Annual Meeting.

The Thirty-Seventh Annual Meeting of this, the most important of the German District Gas and Water Associations, was held at Berlin from March 25 to 27.

The annual report showed that the membership roll, which comprised 2 honorary and 186 ordinary members at the beginning of the year, closed the year with 4 honorary and 185 ordinary members. The attendance at the meeting was as good as in former years, though the programme had been considerably curtailed on account of war conditions. The meeting was presided over by Herr Kümmel, of Charlottenburg, who, not being eligible for re-election, is succeeded as Chairman by Herr Pohmer, the Manager of the Mariendorf Gas-Works at Berlin.

The technical proceedings opened on March 25 in the large hall of the Association of German Engineers. The principal item was an informal discussion on the subject of Gas, Electricity, and Water Works in War Time. It was opened by Herr Lempelius, the Manager of Central Gas Publicity Bureau of Germany, who dealt with the supply of coal, the sale of bye-products, labour conditions, and the State embargo on metals. He is reported to have thrown many interesting side-lights on the corresponding conditions in the countries which are at war with Germany.

On March 26, a visit was paid to the Museum of the Lighting, Heating, and Water Industries, which has recently been greatly enlarged and is housed in new quarters in Charlottenburg. The visitors were conducted over the museum by Herr Müller, of Charlottenburg, who had been elected on the preceding day an Honorary Member of the Association. On March 27, the members visited the Gitschinerstrasse Works of the Berlin Corporation Gas Undertaking, and were shown by Herr Pillert, the Manager, the new debenzolizing plant, which the report states is of the greatest importance to the country at the present time.

Meldrum Forced-Draught Furnaces.

Over 400 of the principal gas-works throughout the United Kingdom (and many abroad) have adopted the "Meldrum" forced-draught furnace for burning coke breeze, retort ashes, and pan breeze; and a photograph of an installation of the improved silent furnaces on Lancashire boilers at the Mitcham Gas-Works is included in the new catalogue of Messrs. Meldrums Limited, of Timperley, Manchester. The case of a colliery, too, is cited, at which furnaces have recently been fitted by the firm for burning dust coal. It was impossible to utilize this with natural draught, and it was being railed away from the pit, and tipped, at a heavy cost. Now, however, more steam is being obtained from the boilers with this fuel than was got before with good coal. The narrow spacing and thin design of the fire-bars, of course, enable even dust fuel to be used without waste. In the silent type, the furnaces are provided with noiseless blowers, which are particularly suitable for cases in which the sound of the steam-jets might cause any annoyance. In connection with one installation of the "Meldrum" furnace mentioned in the catologue, measurements were recently taken for a week of the fuel and water used; and, as the result, the proprietor gave, as his cost of evaporation, the figure of 2s. 2d. per 1000 gallons.

Enemy Businesses to be Wound-Up.—Among recent orders which have been made by the Board of Trade requiring enemy businesses to be wound-up, are the following: E. M. Brinckman and Co., No. 99, Redcross Street, Southwark, S.E., merchants (electric lamps, batteries, and gas-mantles). Bleichert's Aerial Transporters, Limited, Egypt House, New Broad Street, E.C. (constructors of aerial wire railways).

Electrical Charging-Waggons for Coke-Ovens.—An installation of electrically-driven waggons for charging coke-ovens, which is described in a German mining journal, has been applied to a battery of sixty coke-ovens, which are kept charged by one man, instead of the ten or twelve required by the old method. The coal-bins are not in a direct line with the axis of the track over the charging hoppers; but the small waggons can take curves down to 5 metres radius. The charging set comprises three waggons of about 3 tons capacity each. Each waggon is 4 metres long, by 1·2 metres wide, and 1·7 metres high, and is divided into two parts with the usual drop-bottoms. Between the two hoppers is the driving motor of 4 KW. capacity, which, together with the starting and other switch-gear, is enclosed in a dust-proof compartment. Power is taken from an overhead trolley-wire; and the motor is controlled by a lever. After the three waggons have been filled at the coal-bins, they are sent along in succession under their own power towards the ovens—the operator following on the last. When the waggons reach the coke-oven platform, the motors are switched-off automatically, and the brakes applied by means of stops projecting up from the track. These stops are placed by the operator at the particular oven it is desired to charge. The waggons are brought into the correct position and emptied by the operator, who then sends them back on their own power and returns himself on the last, after having closed the top of the filled oven and moved the stops to the next oven to be filled.

THE CONTROL BOOK.

By JOHN TERRACE, of Grimsby.

[A Paper read before the Eastern Counties Gas Managers' Association, May 12.]

Notwithstanding the existence of a state of war, efficiency of control is of vital importance to any business. In fact, it makes it the more important; and anything which can help the manager responsible for the success of the work should be worthy of consideration.

The first necessity is the availability of the necessary statistics, costs, &c.; and as the writer has in daily use a book which is an attempt to gather all such figures together in a concise form for ready reference, he proposes to place particulars of it before the members, in the hope that it will be of use to some, and of interest to all, members.

No claim is made for any great originality either of the collection of the information or the forms used. They have been gradually evolved to suit the requirements of the Company's business, and are readily adaptable to other needs.

For the benefit of some of the younger members of the Association whose duties may have been confined somewhat to the chemical and engineering sides of the business, several of the methods of calculation are given at considerable length. Although from the descriptions, in some cases it may appear that the obtaining of the figures is likely to entail much work, the writer can assure members that this is not so. On the other hand, the value of the information would in his opinion justify the expenditure of a considerable amount of labour. He would strongly recommend all the younger managers and assistants to work out regularly each half year an analysis of their respective company's revenue accounts, as careful comparison of the figures with the statistics of other gas undertakings published from time to time is of the greatest utility and interest.

The necessity of keeping accounts in the standard form prescribed by the Gas-Works Clauses Act is a great help, as an analysis of them enables comparisons to be easily made. But it cannot be overlooked that the variation in the amounts charged to certain items—especially repairs works and repairs mains—is due to the inclusion in these amounts of charges other than those strictly defined by the label. That the policy of charging freely to these items is a good one is almost universally agreed; but unless some method is adopted of keeping account of the extra expenditure which is included, there is, in the writer's opinion, great danger of the actual amount spent on unremunerative work being hidden from the knowledge of the manager, to the detriment of the financial working of the undertaking. That the doing of unremunerative work is bad policy, the writer does not for a moment suggest. He believes entirely it is as necessary to include good service as good gas in the price charged per thousand cubic feet to the consumer; but the amount spent on such work should be known to the manager when the accounts are being made up. No difficulty whatever need be experienced in this. The writer has for some years adopted the method of journalizing such charges to transfer them to the repairs mains account.

This, of course, only tells the lump-sum so spent; and as the figure thus dealt with showed a steady increase and eventually became so large, he felt that more details of it should be available. To do this he has arranged for a simple set of books to be used in conjunction with the existing work card system; and these would now have been in operation but for the unfortunate shortness of staff due to the war. He does not, therefore, propose to deal at length with this matter in the present paper, though doubtless it would prove a profitable matter for discussion. It is mentioned as a point which must not be overlooked

FORM 1.—*Weekly Return, Manufacture and Output, to June 30.*

—	Gas Made.	Coals Used.		Coals Advised.		Gas per Ton.	Coals per Retort.		Gas Sent Out.		
							No. 1 House.	No. 2 House	Amount	Increase.	Decrease.
		Tons.	Cwts	Tons.	Cwts						
January 8 . .	7,955	657	10	429	12	12,097	5·16	10·45	7,881	..	16·08
,, 15 . .	7,936	650	10	698	1	12,200	5·02	10·73	8,013	..	12·22
,, 22 . .	7,148	590	16	724	16	12,098	4·98	10·76	7,508	..	16·44
,, 29 . .	7,719	640	17	660	9	12,045	4·95	10·50	7,278	..	13·89

FORM 2.—*Weekly Wages to June 30.*

1915.			1916.			Increase + Decrease −
	£	£		£	£	
Jan. 9 . .	200		Jan. 8 . .	180		− 20
,, 16 . .	200		,, 15 . .	180		− 20
,, 23 . .	200		,, 22 . .	180		− 20
,, 30 . .	200		,, 29 . .	180		− 20
		800			720	

FORM 3.—*Weekly Bank Balances to June 30.*

1915.				1916.			
	£	s.	d.		£	s.	d.
Jan. 4 . .	2300	1	6 Cr.	Jan. 3 . .	2320	2	3 Cr.
,, 11 . .	2700	2	2 Cr.	,, 10 . .	2000	1	6 Cr.
,, 18 . .	2000	1	6 Cr.	,, 17 . .	2700	2	2 Cr.
,, 25 . .	2320	2	3 Cr.	,, 24 . .	2420	1	3 Cr.

FORM 4A.—*Weekly Return, Meters, to June 30.*

—	Ordinary.					Slot.					Slot Repairs.
	Fixed.	Off.	Changed.	Inc.	Dec.	Fixed.	Off.	Changed.	Inc.	Dec.	
January 8	..	7	2	..	7	9	2	17	7	..	203
,, 15	3	6	13	..	3	6	1	7	5	..	177
,, 22	2	2	2	..	..	2	2	12	..	..	172
,, 29	3	3	3	..	..	3	5	21	..	2	167

FORM 4B.—*Weekly Return, Cookers, Fires, &c., to June 30.*

—	Cookers.				Fires.				Radiators.				Governors.			
	Fixed.	Off	Inc.	Dec.	Fixed.	Off	Inc.	Dec.	Fixed.	Off.	Inc.	Dec.	Fixed.	Off.	Inc.	Dec.
January 8	10	1	9	..	7	1	6	..	2	2	..	..	3	..	..	..
,, 15	8	4	4	..	8	..	8	..	3	9	..	6	..	..	..	..
,, 22	4	9	..	5	4	5	..	1	9	3	6	..	4	1	3	..
,, 29	6	6	..	..	4	4	..	..	9	2	7	..	1	3	..	2

FORM 4C.—*Weekly Return, Lamps, Hot Water, &c., to June 30.*

—	Low-Pressure Lamps.				High-Pressure Lamps.				Fittings Converted.	Geysers and Circulators.				Coppers.
	Fixed.	Off.	Inc.	Dec.	Fixed	Off.	Inc.	Dec.		Fixed.	Off.	Inc.	Dec.	
January 8	9	1	8	..	6	1	5	..	1	3	1	2	..	3
,, 15	12	3	9	..	5	4	1	..	3	1	..	1	..	1
,, 22	3	5	..	2	7	8	..	1	1	..	1	..	1	2
,, 29	4	9	..	5	2	9	..	7	5	9	2	7	..	4

FORM 5A.—*Monthly Return.*

—	Month.		Aggregate for Half Year.	
Gas sent out this year, cubic feet	28,836,000	..	91,887,000	..
,, ,, last ,, ,,	29,759,000	..	102,196,000	..
	923,000 Dec.	3·10 per cent.	10,309,000 Dec.	10·08 per cent.
Gas used on works this year, cubic feet	2,883,000	..	9,188,000	..
,, ,, last ,, ,,	2,976,000	..	10,219,000	..
	93,000 Dec.	3·12 per cent.	1,031,000 Dec.	10·00 per cent.
Total wages this year, four weeks	£628 15 0	..	£1928 13 6	..
,, ,, last ,, ,,	647 15 9	..	2121 6 6	..
	19 0 9 Dec.	2·93 per cent.	£192 13 0 Dec.	9·08 per cent.
Gas made, cubic feet	28,660,000	..	91,634,000	..
Coals used, tons	2,427	..	7,663	..
Gas made per ton, cubic feet	11,809	..	11,958	..
Number of mantles used on lamps	876	..	2,628	..
Number of lamps	876	..	876	..
Mantles per lamp per annum	12	..	12	..
Show-room returns this year	£125 9 9	..	£384 15 7	..
,, ,, last ,,	149 8 4	..	415 18 10	..
	£23 18 7 Dec.	16 10 per cent.	£31 3 3 Dec.	7·45 per cent.

		Per 1000 Cubic Feet Sold.	Last Year.		Per 1000 Cubic Feet Sold.	Last Year.
	£ s. d.	d.		£ s. d.	d.	
Cost into holder—						
Coals (including unloading)	2748 4 7	24·56	..	8321 8 10	23·33	18·43
Less residuals	1657 11 11	14·81	..	4878 1 8	13·67	9·93
Net coals	1090 12 8	9·75	..	3443 7 2	9·66	8·50
Wages	243 12 5	2·18	..	714 18 1	2·00	2·49
Purification	26 1 1	0·23	..	60 2 6	0·17	0·31
Salaries	113 0 10	1·01	..	360 4 1	1·01	1·05
Wear and tear	462 1 5	4·13	..	974 7 9	2·73	3·14
Net cost into holder	1935 8 5	17·30	..	5552 19 7	15·57	15·49

—	This Month.	Last Month.	+ or −	Make per Ton of Coal.	—	Maximum.	Minimum.	Average.
Stocks—								
Coal in stores	4609	4322	+ 287	..	Illuminating power	15·50	14·08	14·66
Coke	18	134	− 116	11·47	Calorific value	560	460	510
Sulphate	41	17½	+ 24½	21	CO_2	2·80	1·80	2·23
Tar	494	479	+ 15	8·8	S	49·23	30·98	41·57
Liquor	409	358	+ 51	29	NH_3	0·68	0·26	0·39
Acid	1¾	6¼	+ 4½	..				

FORM 6.—*Cost Account. Month.* *Half-Yearly Aggregate.*

Gas sent out, cubic feet	28,836,000				91,887,000			
Less leakage, 6·85 per cent., cub. ft.	1,975,000				6,294,000			
Gas sold, cubic feet	26,861,000				85,593,000			
	Amount.	Cost per 1000 Sold.			Amount.	Cost per 1000 Sold.		Last Year.
	£ s. d.	d.	s. d.		£ s. d.	d.	s. d.	d.
Coals	2,748 4 7	24·56			8,321 8 10	23·33		18·43
Purifying	26 1 1	0·23			60 2 6	0·17		0·31
Wages	243 12 5	2·18			714 18 1	2·00		2·49
Salaries	113 0 10	1·01			360 4 1	1·01		1·05
Repairs works	462 1 5	4·13			974 7 9	2·73		3·14
Inspectors and clerks	14 11 0	0·13			46 7 3	0·13		0·13
Repairs mains	238 7 10	2·13			759 12 9	2·13		2·61
Repairs meters	104 14 11	0·93			291 13 4	0·82		0·99
Repairs cookers	21 13 4	0·19			73 19 1	0·20		..
Lighting and repairing public lamps	..	..			..	..		0·10
Rates and insurance	228 6 4	2·04			727 10 9	2·04		1·91
Management	274 4 1	2·45			873 15 1	2·45		2·34
Law, bad debts, and war dep.	60 8 8	0·54			192 11 6	0·54		0·54
	4,535 6 6		3 4·52		13,396 11 0		3 1·55	2 10·04
Less Credits—								
Coke	1,309 14 8	11·70			3,846 17 10	10·78		6·79
Tar	83 2 10	0·74			376 0 0	1·06		1·53
Sulphate and ammoniacal liquor	264 14 5	2·37			655 3 10	1·83		1·61
Rents and miscellaneous receipts	45 17 9	0·41			146 4 4	0·41		0·46
Meter and stove rental	98 9 10	0·88			313 16 10	0·88		0·87
	1,801 19 6		1 4·10		..		1 2·96	11·26
Net cost	2,733 2 1		2 0·42		7,856 12 7		1 10·59	1 10·78
Balance estimated gross profit	1,296 0 10		0 11·58		4,982 3 4		1 1·41	10·33
Net amount received for gas sold	4,029 2 11		3 0·00		12,838 15 11		3 0·00	2 9·11
Estimated gross profit	..	..	0 11·58		..	..	1 1·41	10·33
,, amount required interest and dividend	..	..	0 11·87		..	..	0 11·87	9·65
,, surplus or deficiency	..	..	0 0·29 Deficit.		..	..	0 1·54 Surplus	0·68 Surplus

FORM 5B.—*Monthly Return (Continued).*

—	Month.				Aggregate for Half Year.			
	Quantity.	Value.	Cost per Ton. This.	Cost per Ton. Last.	Quantity.	Value.	Cost per Ton. This.	Cost per Ton. Last.
	Tons. Cwt.	£ s. d.	s. d.		Tons.	£ s. d	s. d.	
Coals—								
Carbonized	2427	2707 2 2	22 3·69		7663	8179 17 6	21 4·18	
Haulage		17 18 10	0 1·77			60 1 5	0 1·88	
Labour		23 3 7	0 2·29			81 9 11	0 2·55	
		2748 4 7	22 7·75			8321 8 10	21 8·61	
Coke and breeze—								
Large	1287 5							
Broken	140 18							
Sales	72 12							
	1500 15	1466 16 5	19 6·53		4400	4186 16 1	19 0·40	
Labour		55 11 9	0 8 88			180 13 3	0 9·85	
Price realized		1411 4 8	18 9·65			4006 2 10	18 2·55	
Tar—								
Sales	91 3	84 13 6	18 7·25		288	301 15 2	20 11 46	
Labour		10 15 8	2 4·44			30 5 2	2 1·20	
Price realized		73 17 10	16 2·81			271 10 0	18 10·26	
Sulphate (sale)—			£ s. d.					
Labour (loading)	20 tons	3 1 8	3 1					
Bags	200	5 0 0	5 0					
Shipping charges		2 0 0	2 0					
		10 1 8	10 1					
Sales (gross amount received)		350 0 0	17 10 0					
Price realized		339 18 4	16 19 11					
Sulphate (manufacture)—								
Liquor	370 tons	111 3 0	3 14 0					
Labour	..	14 3 8	9 6					
Acid	28½ ,,	142 10 0	4 15 0					
Lime	4½ ,,	4 10 0	1 3 0					
Sulphate made	30 ,,	272 3 8	9 1 6					
Cost account—			s. d.					
Estimated gross profit			0 11·58				0 13·41	0 10·33
,, amount required interest and dividend			0 11·87				0 11·87	0 5·65
,, surplus or deficiency			0 0·29 Def.				0 1·54 Surplus	0 0·68 Surplus

in the efficient control of working, as the accurate knowledge of how the expense has been incurred is essential to the accurate judgment of whether or not any scheme—such as the hire or loan of any apparatus or the amount spent in free maintenance—really pays, and does not in some cases more than counterbalance any advantage likely to accrue.

The "Control Book" used by the writer is of foolscap size, with the usual faint blue ruling without margin, and contains some 80 pages. The necessary additional ruling is done each half year for the weekly entries, and once a month for the monthly returns and cost account; and the actual time in doing it is comparatively small.

THE UTILITY OF THE FORMS.

Forms 1, 2, 3, and 4A, 4B, 4C, are employed for weekly returns, Forms 5A and 5B for monthly returns, and Form 6 is a monthly cost account.

Form 1 gives information respecting the manufacture and output, and calls for very little remark. Further items could, of course, be added; but too many details too often do not help the manager to see the results in their true perspective.

Form 2 shows the total amount spent each week on wages, and, for the purposes of comparison, the amount paid for similar periods of the corresponding half year previous. The monthly totals are carried to the monthly returns.

Form 3 shows the weekly bank balance compared with that on the same date of the previous year.

Forms 4A, 4B, and 4C are convenient for recording the progress made in the fixing, &c., of various kinds of apparatus used by the Company.

Forms 5A and 5B gave a monthly summary of various items concerning the working of the business; and the value of the figures is greatly enhanced by the addition in each case on 5A of the figures for the half year to date, and on 5B those of the corresponding year previous. It appears very desirable to the writer to know month by month the net cost into holder for that month and the aggregate for the half year; and although each item of cost also appears in the cost account, the summarizing of them in this form is found to be an advantage. The form of summary of stocks is also convenient; and the coke, tar, and sulphate figures worked out and entered into the column "Made per Ton of Coal" readily call attention to any great variation in the revenue likely to occur from these products.

The use of the figures on form 5B may not at first seem quite clear, and a little explanation therefore desirable. In the analysis of accounts mentioned above, the costs are worked out at per 1000 cubic feet sold, and also at per ton of coal carbonized. The figures on form 5B are, however, worked out at cost per ton of material handled. One has only to consider the largeness of the bulk of coal and coke handled in even a medium-sized gas-works in twelve months to realize the importance of the total amount represented by a few pence per ton, and the advantage of knowing the cost of handling. That the figure must necessarily vary according to various delays, which in practice are unavoidable, is admitted. But the so-called unavoidable delays are not always quite unavoidable; and when one sees the degree to which costs are adversely affected by them, it is wonderful how some of the difficulties can be overcome.

A summary of the "Cost Account" is given, so as to complete the monthly returns. Thus all the information may be shown at one opening.

Form 6 shows the method of keeping the cost account. In the arrangement of this, the writer has borrowed largely from the form of accounts used by the Middlesbrough Corporation gas undertaking; and he takes this opportunity of acknowledging his indebtedness. Probably no cost account that has ever yet been devised is perfect; and it is much easier to find fault with the figures than to suggest remedies. In the present instance, as many as possible of the figures given in the "Amount" column are the actual amounts spent, and not worked back from the estimated cost per 1000 cubic feet. Nevertheless one has to admit that in some of the items the results may be misleading, more especially if only the monthly figures are considered. For instance, in the case of repairs works, the amount spent on this item is usually greater in summer than in winter; and as the cost per 1000 cubic feet is obtained by dividing the amount expended by the estimated gas sold, the cost per 1000 cubic feet given in (say) the month of January is much less, and in June much more, than the figures likely to be found in the analysis of the balance-sheet. The aggregate figures, however, will greatly help to get over this difficulty. The net amount received for gas is taken from the analysis of half-yearly accounts—due provision being made when there has been alteration in the price of gas. The amount required for interest and dividend for the half year is each month divided by the gas sold in the corresponding half year previous, corrected for increase or decrease.

It is found convenient to keep a small ledger with accounts for the various items; and for the benefit of those who may not be familiar with the book-keeping entries of gas companies accounts, a few of the entries are given in Form 7. The labour involved in working out the costs per 1000 cubic feet is reduced to a minimum if a table like Form 8 is prepared. The amount of gas sold

FORM 7.—*Nominal Ledger for Cost Account, Coals.*

	Tons	Cwt.	£	s.	d.				£	s.	d.
To stock last month .	5109	3	4323	7	0	By balance To cost account } used	2426	18	2748	4	7
,, labour			23	3	7	By stock this month .	5194	11	4331	3	11
,, haulage			17	18	10						
,, invoices	2512	6	2714	19	1						
	7621	9	7079	8	6		7621	9	7079	8	6

Coke and Breeze.

			£	s.	d.				£	s.	d.
To stock last month .	134	0	117	5	0	By sales large . .	1287	5			
,, labour			55	11	9	broken . .	140	18			
,, balance to cost account made . .	1384	15	1309	14	8	breeze . .	72	12	1466	16	5
						By stock	18	0	15	15	0
	1518	15	1482	11	5		1518	15	1482	11	5

FORM 8.—*Pence per* 1000 *Cubic Feet of Gas Sold.* (*Month*, 26,861,000 *Cubic Feet*).

	£	s.	d.		£	s.	d.		£	s.	d.
1	111	18	5	·1	11	3	10	·01	1	2	5
2	223	16	10	·2	22	7	8	·02	2	4	9
3	335	15	3	·3	33	11	6	·03	3	7	2
4	447	13	8	·4	44	15	4	·04	4	9	6
5	559	12	1	·5	55	19	2	·05	5	11	11
6	671	10	6	·6	67	3	1	·06	6	14	4
7	783	8	11	·7	78	6	10	·07	7	16	8
8	895	7	4	·8	89	10	9	·08	8	19	1
9	1007	5	9	·9	100	14	7	·09	10	1	5
10	1119	4	2								
11	1231	2	7								
12	1343	1	0								

is divided by 240, being the number of pennies in a sovereign; the resultant amount being the equivalent of one penny—thus:

$$\frac{26{,}861{,}000}{240} = £111\ 18s.\ 5d.$$

The other figures are then easily obtained, and the working-out of the item wages would be:

	£243 12 5
2.00d.	223 16 10
	£19 15 7
0·10	11 3 10
	£8 11 9
0·07	7 16 8
2·17d.	£0 15 1

DISCUSSION.

The PRESIDENT (Mr. A. E. Broadberry) said the paper had been a most interesting one; and in order to get the discussion started, and at the same time to introduce a gentleman who was of great importance in that particular room, he would ask Mr. Fussell, the recently appointed Secretary of the Tottenham Light, Heat, and Power Company, for any comments he had to make.

Mr. E. J. K. FUSSELL thanked the President for his kind invitation to take part in the discussion. He should, in the first place, like to congratulate Mr. Terrace on his very valuable paper. The subject matter was of great importance to gas managers; and the views of the author were presented in a very concise and admirable manner. There were two or three points that struck one. Although the Gas-Works Clauses Act did make provision for keeping accounts in separate form, it was not always safe to accept for comparison purposes the published accounts prepared on those lines. Mr. Terrace had already pointed out the danger that often arose under the heading of repairs and maintenance. Since the passing of the Gas-Works Clauses Act, gas companies had been called upon to deal with cookers, gas-fires, and prepayment installations; and no provision was made in the Act for dealing with these items. A great many companies no doubt did make proper provision for depreciation under these particular heads; but if one took the published accounts, it was very rarely that one found depreciation separated from the repairs item. Unless Mr. Terrace had adopted a store system, with weekly or daily records, some of the figures might be rather misleading. A great many companies made their appropriations from invoices direct; but unless fluctuations in stock were taken into account, the figures were rather misleading. They ought to be thankful to Mr. Terrace for the able way in which he had put forward his idea; he (Mr. Fussell) was sure it would be of great service.

Mr. W. B. FARQUHAR (Ilford) said he should like to add his appreciation of the paper Mr. Terrace had given them. It was, he thought, going to be very useful, and lead to a more careful study of the items. At his own works, they had for a great number of years kept an analysis book, in which was an analysis of the various items, both material and wages, under their respective headings. These were summed-up every month; and there was a final summing-up every half year. Thus they kept the monthly returns and records of the corresponding half years with which to make comparison. With regard to the "coals used" in form No. 1, he should like to know whether Mr. Terrace estimated the coal used or weighed it into the retorts; also, if he estimated it, on what did he base his figure; and, further, whether in getting out his final stocks at the end of the month he measured-up the coal-heap, or simply took the coal used on his figures. There was also a little item in Form No. 5A. This was headed "Monthly Return;" but he noticed the total wages were given for four weeks. There were always in every month a few days over four weeks; and he should like to know what Mr. Terrace did with the extra two or three days' wages, because, if he had a monthly return for the gas sent out and so on, and then worked out four weeks wages on that, there would be a discrepancy. The other items he had looked over were very interesting. As a matter of fact, he (Mr. Farquhar) had himself had in mind making an extension of his own system; but the war intervened, and he had no assistance with which to elaborate the system more than at present. He was sure every gas engineer would find these figures very useful; and they would enable them to keep the records of their own work on similar lines.

Mr. J. H. BREARLEY (Longwood) said Mr. Farquhar had raised one of the chief points that he himself had thought of mentioning in connection with the paper. This was as to whether the coals were actually weighed or only estimated, and at the end of the month measured as stock. If the coals were not carefully estimated, this would make a great deal of difference to Form No. 5A, which was the monthly return, showing the cost of gas into the holder. Coal, as they knew, was the most important item in the costs. In the table they saw that at these works there was a cost of 24·56d. for coal; and there was no other item that came anywhere near it. He presumed that Mr. Terrace would probably estimate his coal from stock, and then, at the end of the month, would have his stock measured up, and take the quantity that he arrived at from that. This would then give him the accurate figure for his monthly return. Of course, these forms looked rather formidable. But, if members would scan them closely, the formidability of them would largely disappear. It must be remembered that they were taken in conjunction with other records on the works, which records were absolutely necessary in progressive undertakings. If they had a card system going, the tabulation of forms like these was a comparatively small matter. He congratulated Mr. Terrace upon the paper. He believed he was following not only in his father's footsteps, but also in the footsteps of his worthy late chief, Mr. Broadberry. He had shown in the paper that his motto was the motto of the Tottenham Company—that was, "Thorough." It was stamped upon the paper very fully that Mr. Terrace desired to see what everything cost, and in what way the cost could be reduced.

Mr. G. A. MALLETT (Ipswich) said that all of them who had to do with gas undertakings in these days must look very closely into costs. He was glad to see that Mr. Terrace's cost for coal and unloading was not so high as in his own case; and he hoped it would not go any higher. But the outlook was a serious one for gas undertakings. A thing that struck him in looking down the returns was how Mr. Terrace arrived at his gas sold month by month. It must be more or less estimated. In his case, they always read their meters quarterly. This being so, Mr. Terrace must of necessity take either the previous quarter's figures or the previous half-year's as the case might be. Therefore, he might not be working correctly to actual present-day figures in his calculations, because they might send out gas, but it was quite another thing to get paid for it. There was, for instance, the leakage account that must be taken into consideration. He thought it would be an admirable thing for all of them to study very closely the figures in the paper. Especially in these days it was their duty to do so; if they were going to earn dividends, they must pay strict attention to their costs.

Mr. T. S. LACEY (London) said it was very advisable if one could get approximate costs in the shortest possible time. It was better to know how one stood approximately within a week or two when he had to spend money than have very accurate accounts regarding something that had transpired three or four months before. The Gas Light and Coke Company tried to do a great deal in this way; but their accounts were complicated by their large number of stations, which involved an enormous amount of work. He had always felt that accounts of this kind were extremely helpful; and he had always been very grateful for any kind of return

that he could obtain, and which gave information in time. Sometimes they might be changing either the material used or some process or modification of method of manufacture which made it desirable to know how they were progressing at the shortest possible notice; and, in these circumstances, costs that could be obtained promptly, even if approximate, were much more valuable than more detailed and accurate accounts two or three months after the money had been spent. He was quite in sympathy with the paper; and he had no doubt it would be very valuable. A large amount of his own time was taken up in the manufacturing part of the work; and the matter of accounts did not come under his immediate notice. Necessarily, however, he had had to study accounts of this kind in respect of their own costs; and he was very grateful if he could get them in in short time. But in calculations of this kind, there was a great deal of work done that was of no earthly use in the way of calculating-out to the third and fourth place of decimals. This was rather a redundancy in accuracy; and if people would only cut-down their arithmetical processes, it was just possible they might get these things in a little quicker. As to the question of the amount of gas sold, it was impossible to obtain the figure month by month; but it did not affect the figures, because, after all, leakage did not as a rule vary greatly during a given year, and it would not be difficult to estimate the amount. The important figure was the gas made, which was a positive, and from that they could deduct the approximate leakage, rather than estimate the gas sold.

The PRESIDENT said the paper dealt with a most important subject. To run for six or eight months (as was the case by the time the half-year's balance-sheet was made out) without knowing where they were driving was like a mariner trying to steer his ship across the ocean without a compass; and the "compass" that Mr. Terrace had placed before them that day was one that was well worth adopting. He should himself, as soon as he got the opportunity, see to what extent the system could be applied to improve the methods they had already in operation for the same purpose. A great deal of what Mr. Terrace had put before them was in the nature of something that had never occurred to any of them before; and the suggestions were very valuable.

Mr. TERRACE said his reply could be very briefly made. None of the criticisms were of a very alarming nature. He quite agreed with Mr. Brearley's description that some of the tables looked rather formidable. They were not actually so when they became acquainted with them. It could hardly be expected that anyone who saw the paper for the first time would be able to do very much in the way of criticizing any of the forms. Mr. Brearley had made mention of his (Mr, Terrace's) connection—his very pleasant connection—for a number of years with Tottenham, and his old chief (their President) had also mentioned it. The question of working out many of these details really had its origin in the Tottenham forms. The system had been modified from time to time according to requirements, and after consulting and considering every bit of information that was available. He heartily agreed with Mr. Fussell's remarks about the meaning of some of the items of the prescribed form of accounts in the Gas-Works Clauses Act. Anyone who had gone carefully into the matter would appreciate what Mr. Fussell meant. With regard to his remarks on the question as to the goods being allocated direct from the invoices to the various accounts, while he knew that some companies did this, he did not believe in it. The most difficult matter —the one which he had in mind—was the question of the fittings account and materials used. All the gas-fittings that were paid for—say, for slot installations—were allocated direct to the fittings account, and from that were charged up to the various accounts; and it was in connection with this weakness that they had in their system the set of books which he mentioned in the early part of the paper. At the present time, and in the figures given in the tables, the amount of repairs and maintenance was written-back at an estimated cost per 1000 cubic feet with corresponding half years. It was a mistake, which often obtained in gas accounts, to carry this too far. He admitted the weakness, knew of it, and had taken steps to remedy it. Perhaps at some future time he might be able to lay before members particulars of the book by which he hoped to effect this object. In regard to Mr. Farquhar's remarks as to the calculated coals used, it was not difficult to keep account of the actual coal in stock, because, as they put coal into stock, they added it on to the amount, and deducted the quantity that had been taken out. It was weighed in both cases. The amount of coal each week and each month was as near as possible actual. In the machine-worked house, the coal-hoppers were filled up to the same point; and the actual weight of coals used was taken from the weight of the trucks of coal. With regard to the monthly returns, and the question of wages being given for four weeks, every third month they had five weeks. The only reason was that this was the total wages paid—not the amount of wages paid for carbonizing. A cheque was drawn each Saturday morning for wages. The totals of these cheques were simply noted, and they were added together; and no useful purpose, so far as he could see, would be served in taking the proportion of that to make up the actual monthly figure. Of course, in the case of the items "coal used," "gas used," and "wages paid," they were all taken from the analysis. Mr. Mallett and Mr. Lacey had mentioned the quantity of gas sold. If they referred to the cost account (Form No. 1), they would find the first line was "gas sent out," which was a figure they had day by day and week by week; and to obtain the estimated gas sold, they took the leakage at a figure which, in their case, had been the same, without any variation, for the last two years. By deducting from the gas sent out 6·8 per cent., they arrived at approximately the gas sold. He heartily agreed with Mr. Lacey's remarks that, even if the figures were not quite accurate, to have approximate ones in good time was better than waiting eight months before they knew what they had been doing during the six months. The only difficulty he found was in getting the invoices in early in order to allocate the amount to works' repairs and such things. They generally managed to get the previous month's costs worked out within a fortnight.

Moved by Mr. BREARLEY, seconded by Mr. R. WARDELL, a hearty vote of thanks was passed to Mr. Terrace.

Mr. TERRACE, in his acknowledgment, said he quite forgot, in replying to the criticisms, to thank the gentlemen who had spoken for their kind remarks. If the paper proved of use, he should be pleased; and if he could be of further help to anyone who cared to take the trouble to write to him, he should be pleased to give all information possible.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Annual General Meeting.

The close of the business of the present session, and of the active work for the time being, of the London and Southern District Junior Gas Association was reached last Friday evening, when the annual general meeting was held at the Westminster Technical Institute, Vincent Square, S.W.—Mr. S. B. CHANDLER (the President) in the chair.

THE PAST SESSION—AND THE FUTURE.

The PRESIDENT, in the course of a few remarks, said he thought that a glance at the record of work done during the session which the meeting was bringing to a close would show that the Association had been very fortunate in their programme, and that every moment of the meetings had been well spent. Eight new members had joined during the session; and the total now stood at 185, of whom no less than 35 were on active service. The death in action of two members—Mr. S. L. Dubery and Mr. V. H. Young—had unhappily taken place. The Association, whose thirteenth session was now completed, had all along fully justified its existence, and had been of educational value to the members. The contributions of the past session had been of an instructive and interesting character—subjects connected with the sales side of the industry having been particularly well represented. Mr. H. Hartley, of the Richmond Gas Stove and Meter Company, had dealt with the modern gas-fire, and had accompanied his lecture by an exhibition of lantern slides and a practical demonstration; while gas-furnaces (which now constituted a highly important branch of the industry) were well covered by a paper by Mr. B. W. Brooks and a subsequent visit to the furnace-shop in Goswell Road of the Gas Light and Coke Company. Then Mr. W. L. Westbrook (a member of the Council) gave them much information with reference to the conversion of an "all-coal" into an "all-gas" kitchen. Lighting problems were dealt with by Mr. E. Stroud (Holophane Limited); and Mr. J. G. Clark (whose keen interest in the Association was well known and much appreciated) also quite recently gave a lantern lecture upon modern methods of illumination, &c. The importance of coke as a fuel for lorries and general traction was well emphasized in a paper read by Mr. E. W. L. Nicol, of the London Coke Committee, who showed what great strides had been made in the application of this form of fuel, and the great potentialities it possessed for the future. To those gentlemen who had thus assisted so ably in making the past session a successful one, they proffered their very best thanks. The "Transactions" would show that the London and Southern Junior Association were well to the fore, in point of both volume of work done and the maintenance of a high standard of educational matter. In addition to the business meetings, there had been three visits—to the South Suburban, Tottenham, and Wandsworth Gas-Works; and in connection with the last named, he was sure the heartiest congratulations of the members were tendered to the Captain and crew of the good ship "Wandle," on the really splendid fight put up by her against the "Kultured" German submarine. The incident would be remembered by the industry for many a day, and added further laurels to the many already to the credit of a nation fighting with absolutely clean hands, not for supremacy, but in the name of civilization, and all that made life worth living.

Turning to the future, the President went on to say that it had been decided, in view of the existing circumstances, to forego the summer meeting which was down on the programme. It was felt that the attendance would probably be small, and that altogether it was better to postpone visiting Hampton Court until a more propitious occasion presented itself. At the last meeting of the Council, the question as to the advisability of carrying on the activities of the Association during the session 1916-17 was discussed. It was thought that, owing to the prevailing condition of affairs (which might continue for some time yet to come), the absence on His Majesty's service of many of the members, and the calling-up under the Military Service Act of those eligible, contributions, visits, and attendances at meetings must suffer, and difficulty would be experienced in arranging anything like a good programme. Of course, visits to works must be curtailed. Engineers and manufacturers were now engaged upon matters of the

very greatest importance; and, while placing upon record the Association's great appreciation of kindnesses from time to time received at their hands in the past, he was sure the members would agree that the present was hardly a favourable time to suggest visits to their works. The Council, therefore, suggested that the work of the Association be suspended for such time as might be found necessary and expedient—the present officers and Council remaining in their respective positions during this period.

ACTIVITY TO BE TEMPORARILY SUSPENDED.

Mr. J. R. GALE proposed, in accordance with the intimation which the President had made, that "the forthcoming session 1916-17 shall, in view of the present circumstances, be suspended until such time as the Council may deem practicable to resume its activities; and that the President, officers, and Council shall remain as now constituted during this period. One meeting to be held at a date to be arranged between October and May next." The necessity for taking this step was, he said, a matter of great regret to them all.

Mr. A. D. WINSLOW, in seconding the resolution (which was agreed to), thought the proposed course would be a great loss to members; but no doubt it was the best thing to be done.

The PRESIDENT remarked that up to the present time they had succeeded in "weathering the storm;" and the members could safely leave it to the Council to resume activities at the earliest practicable date.

THE BALANCE-SHEET ADOPTED.

The HON. SECRETARY (Mr. George Winslow) then went through the items of the balance-sheet, which, he thought, considering the present crisis, was one of which they might well be proud.

On the proposition of Mr. W. E. BROWN, seconded by Mr. C. J. LOVE, the balance-sheet was adopted.

VOTES OF THANKS.

Mr. D. J. WINSLOW said he had to propose a resolution which he was sure would meet with the hearty approval of all the members. It was—"That this meeting sincerely acknowledges, and hereby places upon record, its keen appreciation of Mr. Samuel B. Chandler's excellent services in conducting and promoting the ideals of the Association as President during the session 1915-16. The business qualities and untiring enthusiasm he displayed have very considerably enhanced the position held by the Association in the industry, particularly in view of the strenuous times occasioned by the war; and the members wish him great success in his future career, and tender to him their sincere thanks." Certainly they owed Mr. Chandler a deep debt of gratitude for all he had done for the Association. They had been proud of him as President during what had been a very difficult session, and at the same time a highly successful one. The resolution would be emblazoned and suitably framed, and presented to Mr. Chandler at some subsequent meeting.

Mr. GALE seconded the vote (which he remarked had been thoroughly well earned); and it was cordially agreed to.

The PRESIDENT, in acknowledgment, said it was largely owing to the excellent manner in which the Council had assisted him that he had been able to do what he had done. He had striven his hardest to maintain the best traditions of the Association.

A hearty vote of thanks to the Council and officers was then passed—on the proposition of Mr. R. A. BRIGGS, seconded by Mr. T. PERRY—and acknowledged by Mr. BROWN.

The PRESIDENT, in declaring the proceedings at an end, intimated that the members would in due course be communicated with as to the date of the next meeting, and also on the question of subscription for the coming year.

Evening Star Chapter, No. 1719.

The installation meeting of the Evening Star Chapter was held last Wednesday at the Freemasons' Hall, Great Queen Street, when the retiring M.E.Z., E. Comp. Thomas H. Adkins, P.Z. 889, installed his successor, E. Comp. F. A. West, the Manager and Secretary of the Pinner (Middlesex) Gas Company. The other two chairs were filled by E. Comp. W. Thomson, of Ramsgate, and E. Comp. A. E. Eves, P.Z. 1201. The other officers installed for the year 1916-17 were:

E. Comp.	W. A. Surridge, P.G. Std. Br., P.Z. 1719, 1201, 1397	Treasurer.
,,	Rae P. Normand	Scribe E.
,,	William Dommett	Scribe N.
,,	A. E. Broadberry	P.S.
,,	F. W. Cross	First A.S.
,,	George Hands	Second A.S.
,,	C. W. Offord	Organist.
,,	A. C. Beal, W. R. Silk, Arthur Valon	Stewards.

The processes of biscuit and bread baking by gas are described and illustrated in the May number of "A Thousand-and-One Uses for Gas," issued by the British Commercial Gas Association. The efficiency and economy of the processes are demonstrated in a convincing manner.

ILLUMINATING ENGINEERING SOCIETY.

The Annual Meeting of the Society was held last Tuesday, at the Royal Society of Arts. In the absence of the President (Sir William H. Bennett), Professor SILVANUS P. THOMPSON, D.Sc., F.R.S., presided. Mr. F. W. Goodenough, the Chairman of the Council, was also present.

After a little formal business,

Mr. LEON GASTER, the Hon. Secretary, presented the

ANNUAL REPORT OF THE COUNCIL.

In the early part of the document, it was recorded that the Presidents of the Institutions of Gas and Electrical Engineers respectively (Mr. John Young and Mr. Charles P. Sparks) have consented to act on the Council during the present year. The Council also recorded with regret the death of two valued Vice-Presidents of the Society—Mr. Edward Allen and Professor Vivian B. Lewes. Among the losses caused by the war have been two of the younger members, Mr. G. Maurice, who perished on the "Lusitania," and Mr. F. Harvey Gooch, who fell in action with the Cameron Highlanders in France.

The report proceeded to review the work of the session. Special mention was made of the report issued by the Departmental (Home Office) Committee on the Lighting of Factories and Workshops, the recommendations of which have received the favourable recognition of the Committee on the Conditions of the Health of Munition Workers. The Council said it would be the duty of the Society to continue their work on this subject, with a view to bringing about wider recognition of the economic and hygienic value of good industrial illumination, and maintaining the interest kindled in these matters. It has been suggested that, as a useful basis for further work, the Society might now pass from the general consideration of the subject to the preparation of information on the conditions of lighting applicable to various trades and industrial processes.

An important question that has been receiving much attention, both in this country and abroad, is the desirability of arriving at a uniform method of expressing the efficiency and illuminating value of gas, electric, and other illuminants. The view is now receiving support that lamps should be rated in terms of the total output of light in all directions.

The following resolution has been proposed by the Committee of the American Illuminating Engineering Society on "Nomenclature and Standards":

> (*a*) That the output of all illuminants be expressed in lumens; (*b*) that illuminants should be rated upon a lumen basis, instead of a candle-power basis; (*c*) that the specific output of electric lamps should be stated in lumens per watt, and the specific output of illuminants dependent upon combustion should be stated in lumens per B.T.U. per hour.

Attention has been given to the scheme for the organization of scientific and industrial research being prepared by the Committee of the Privy Council. The Society will take steps to bring to the notice of this Committee any problems on which research would be beneficial in the interests of the lighting industry. The Society have intimated willingness to take part in any movement calculated to bring about unity of effort in these matters, and to co-operate in any investigations bearing on the practical applications of light in relation to illuminating engineering. The Council also consider that the moment is opportune to proceed with the work of the Committee on Research, the appointment of which was decided upon in 1914, but was delayed owing to the outbreak of war.

The Council appeal for additional support. The Society save expense by the arrangements made for the publication of the transactions; and they have not been called upon to pay many customary expenses, such as rent of offices, secretary's salary, &c. Nevertheless, the experience of the year has served to emphasize the desirability of securing additional funds in order to enable the work to be carried on in a satisfactory manner. In the present circumstances, the Council are unwilling to recommend any radical departure in this respect; but it is evident that in the near future the Society must either secure a considerably enlarged membership, or increase the present moderate subscription to £2 2s.

PASSING OF TWO GAS EXPERTS—A GRACEFUL REFERENCE.

Professor SILVANUS THOMPSON said it was a matter on which the members might congratulate themselves that, despite the difficulties and discouragements of war time, their Society was able to keep itself not only alive, but very much alive, and the interest had been well-sustained. The Society had eminently justified its existence in having, mainly by its activities, brought about the recognition on the part of the Government of the necessity of seeing that lighting in factories was good. The whole function of the Society was to improve lighting by whatever means; and the fact that Departmental Committees and officials of the Home Office were now persuaded that this was a step to be fostered by Government aid was a justification for the existence of the Society. This should be an encouragement to go on in the future. There were, too, other points to which he might fittingly draw attention. The first was the circumstance that the Presidents of the Institution of Gas Engineers and the Institution of Electrical Engineers, Mr. John Young and Mr. Sparks, had kindly consented to act, as their predecessors had done, as members of the Council during the ensuing year. It was a matter of congratulation to a young

Society to secure the co-operation of the leading members of the older and more specialized Societies. Then they had lost two very valuable members, both of whom took a keen interest in the Society, and both of them unfortunately belonged to one side—the gas side of the Society. Mr. Edward Allen, whose name was so well known to every gas engineer, and Professor Vivian Lewes, who was an apostle of good lighting in the direction of gas, had both left them—for ever. The members could only hope that they might find men who would as keenly represent the gas side of the subject of illumination as their two lost friends did in their time.

Mr. F. W. GOODENOUGH, in formally moving the adoption of the report, said he should like first of all to say how much the remarks Professor Silvanus Thompson had made respecting the loss by death of Mr. Edward Allen and Professor V. B. Lewes would be appreciated by the gas industry, and by all the friends of the departed. The death of Mr. Allen was rendered more sad by the death quite recently of his eldest son; so that the family had been heavily bereaved during the past year. Both Mr. Allen and Professor Lewes were victims of the war. Mr. Allen wore himself out as a member of the High Explosives Committee of the Ministry of Munitions; and it was while on similar work that Professor Lewes caught his fatal cold. Speaking of the rest of the report, it was certainly one that caused the members to feel satisfaction that, during such a time as that through which they were passing, they should have been able to keep up the work of the Society to the extent they had been able to achieve. It was, therefore, with all the more regret that one had to call attention to the paragraph in the report which pointed out that, on the financial side, the Society had felt the strain of the war, as many other institutions were doing; and one could only hope that some of the undertakings that provided illuminants would be able to recognize in some way the good work the Society had done in helping to bring about, and to give publicity to, the report of the Home Office Committee on factory and workshop lighting, because the action of the Government in stipulating for good lighting in factories and workshops was bound to have a beneficial effect on all suppliers of illumination. The work the Society had done could be recognized in this connection. In conclusion, he said he was only voicing the opinion of the Council in saying that they were greatly indebted to Mr. Gaster for the good work he had done for the Society.

Mr. O. P. MACFARLANE seconded the motion, which was unanimously carried.

Mr. GASTER asked to be allowed to acknowledge the kind remarks of Mr. Goodenough, and to say how much he in turn was indebted to Mr. Dow for his assistance.

Mr. S. R. MULLARD proposed, and Mr. J. F. CROWLEY seconded, a vote of thanks to the President, the Chairman of Council, the members of Council, and the officers for their services during the past year.

This was also cordially agreed to.

A vote of thanks was heartily passed to the Royal Society of Arts for their courteous permission to use their rooms during the session, and to Sir Henry Trueman Wood, the indefatigable Secretary of the Society of Arts, for his courtesy and assistance.

INTERIM REPORT OF THE COMMITTEE ON RESEARCH.

Mr. J. S. DOW presented the report of the Committee on Research. It was a long document, and we can only indicate the nature of the contents.

The appointment of the Committee was announced at the end of the session of 1914; but, owing to the disturbance caused by the war, it was not found practicable at that time for the Committee to take up the tasks before it. The present moment, when so much attention is being devoted to the promotion of scientific and industrial research, however, appears favourable for the resumption of the work.

The following gentlemen have at present been nominated to serve on the Committee: Mr. A. Blok, Mr. J. G. Clark, Mr. W. C. Clinton, Mr. J. F. Crowley, Mr. F. W. Goodenough, Lieut. Haydn T. Harrison, R.N., Dr. James Kerr, Professor T. Mather, Professor J. T. Morris, Mr. S. R. Mullard, Mr. C. C. Paterson, Professor Silvanus P. Thompson (Chairman), Mr. A. P. Trotter, Mr. F. W. Willcox; *ex officio* Mr. L. Gaster (Hon. Secretary), and Mr. J. S. Dow (Assistant Hon. Secretary).

The immediate object of the Committee was to prepare a list of subjects specially deserving of research at the hands of the Society. While not intended to be exhaustive, the list already contains many more subjects for investigation than could be at present undertaken by the Society. It will, however, serve to show how past discussions have developed prospects of further useful work, and the many opportunities for research which now present themselves. Some of the investigations in contemplation will involve co-operation with other Societies and Institutions.

In connection with subjects of importance from the industrial standpoint, the Committee suggest that priority should be given to investigations relating to the development of lamps and lighting appliances, and researches having for their object the elucidation of general problems on which the development of the lighting industry depends. As an instance, the investigation of the properties of illuminating glassware is a matter which, in the opinion of the Committee, should receive immediate attention at the hands of a Special Sub-Committee appointed for the purpose.

Another subject which merits early attention, in view of its relation to the dyeing and colour industries, is the preparation of a standard series of colours and, in particular, of a standard white surface, suitable for acceptance in all researches in which the accurate definition of colour is involved. Conjointly with this subject the design of suitable apparatus for analyzing and specifying colour, and for measuring the reflecting power of various materials, should receive attention. There is also the further problem of providing a fixed standard for the permanence of coloured materials.

In view of the growing recognition of the need for precise quantitative specifications of illumination required in practice for different purposes, the preparation of a standard specification for illumination photometers, to be used in determining the performance of legal contracts involving the measurement of illumination, might be studied with advantage. The general question of the simplification of illumination photometers, and particularly the problem of producing a direct-reading instrument based on physical or chemical effects, should also be borne in mind.

Among other matters which, in view of their important bearing on the future development of lighting, deserve special attention, may be mentioned: The study of glare and the limits of permissible intrinsic brilliancy; the investigation of the comparative effect on vision and the physiological influence in inducing fatigue of natural and artificial illumination and of various systems of artificial lighting; and the conditions, as regards the intensity of illumination and arrangement of lights, desirable for various industrial operations. It is suggested that the preparation of an illustrated bulletin forming a guide to the best present practice in various sections of industrial lighting, might be undertaken.

In the list of researches, the various suggestions have been roughly classified under the following headings:

(*a*) Photometry, Standards of Light, and Researches on Colour.
(*b*) Electric, Gas, and other Illuminants.
(*c*) Lighting Appliances.
(*d*) General.

In regard to "*a*," the report comments on the following matters: (1) The production of a satisfactory standard of light. (2) The development of a standard laboratory photometric equipment to take the place of those designed abroad. (3) The specification of a series of standard colours. (4) The standardization of methods of analyzing and specifying colour, and design of simpler instruments for testing same. (5) The standardization of the so-called "Artificial Daylight" (*i.e.*, the various forms of artificial light used in conjunction with special devices in order to imitate the colour of natural light). (6) A closely related problem is the effect of different qualities of light on the permanence of colours. [Nos. (3), (4), (5), and (6) would require the co-operation of representatives of the chief industries concerned with coloured goods and coloured matching.] (7) The subject of colour-photometry, on which much experimental work has been done, requires clearing up. (8) Direct-reading physical photometers. (9) The design of better and simpler illumination photometers.

In regard to "*b*"—Electric, Gas, and other Illuminants—(10) Experiments on the improvement of lamps are naturally undertaken mainly by manufacturers, but questions of scientific interest arise, the elucidation of which would be of value in establishing the principles governing the efficiency of illuminants. In many such cases, the immediate commercial return may not be sufficient to induce individual manufacturers to make experiments. But there is scope for the prosecution of such inquiries in the laboratories of technical and scientific institutions; and the Society would gladly welcome co-operation on the part of the manufacturers, and suggestions regarding experiments of this nature. The time is ripe for promoting greater uniformity in methods of testing and describing the illuminating value of lamps of various kinds; and it would be advantageous if general agreement on this point could be obtained.

The same remarks apply to "*c*"—Lighting Appliances (Globes, Shades, Reflectors, &c.). In this connection, too, it is proposed that a Sub-Committee should be appointed to consider: (11) The best means of promoting the scientific study of lighting glassware and of encouraging the manufacture of kinds of glass which have not hitherto been developed very satisfactorily in the British Isles. Among such varieties may be mentioned suitable heat-resisting glass for use in chimneys, globes, &c., used with high temperature illuminants; white diffusing glassware having suitable qualities as regards minimum absorption of light, uniformity of structure, and diffusion of light; neutral tinted glass of specified absorbing value required for optical and photometric work; and special varieties of coloured glassware used for the production of "artificial daylight." (12) Appropriate methods of testing and prescribing the requisite qualities of glassware of the above kinds. (13) Uniformity of method in testing and specifying the distribution of light absorption and other qualities of globes, and reflectors of importance from the illuminating engineering standpoint. (14) The best means of promoting agreement as to uniform sizes and shapes of glass articles in common use in the lighting industry, in cases where uniformity is desirable in the interests of manufacturers and the public.

As to "*d*," among other suggestions may be noted: (15) Research work on an instrument for the automatic control of artificial light in factories, schools, &c. (16) As a development of the Home Office report on factory lighting, it would be helpful to make further unofficial investigations on the conditions desirable for various classes of work, and subsequently to issue these as a brief series of recommendations for the guidance of managers and others

interested in factory lighting. (17) A good deal remains to be done in further prosecution of the work of the daylight illumination in schools. (18) Street lighting, after the war, will be a good field for effort, particularly as regards the development of more decorative forms of design, as well as more scientific treatment as regards the shading of lamps and the distribution of light. As regards the design of lanterns to be placed outside public buildings, work might very well be done in co-operation with Arts and Crafts Associations and the London Society. (19) Searchlights. (20) Visibility. (21) Lighting of rifle ranges. (22) An inquiry is suggested into the physiological difference between natural and artificial light—*e.g.*, the intensities considered necessary for vision. (23) Investigation of the conditions determining permissible limits of intrinsic brilliancy. (24) The problem of devising some means of judging the comparative effect on the eyes of various methods of lighting, as regards fatigue, comfort of vision, &c. (25) Library lighting. (26) Lighting of museums and picture galleries. (27) Lighting of hospitals. (28) Testing the gloss of paper, and the determination of a standard of mattness. (29) Nomenclature of illuminating engineering. (30) Tests of the effect of varying the reflecting power of walls, ceilings, and floors in rooms.

After a short discussion,

On the motion of Mr. GOODENOUGH, seconded by Dr. RUDOLF LESSING, the report was adopted.

A vote of thanks to Professor Silvanus Thompson for presiding was heartily passed.

UTILIZATION OF COKE BREEZE.

The "Zeitschrift für Angewandte Chemie" for Jan. 14 last gave an abstract of a paper by Herr Viktor Schön, of the Budapest gas undertaking, which was published in two numbers of the "Zeitschrift" of the Association of Gas and Water Engineers of Austria and Hungary. The paper describes methods of utilizing coke breeze which have been tried at the Budapest Gas-Works.

The author mentions that coke breeze of less than $\frac{3}{8}$-inch in size accumulates to such an extent in gas-works that efforts have to be made to discover uses for it on the works—*e.g.*, as boiler fuel, or as fuel in gas-producers. At the Obuda Gas-Works at Budapest good results have been obtained, in boilers fitted with chain grates, from brown coal mixed with 25 to 30 per cent. of coke breeze; but coke breeze alone did not answer in the boiler furnaces. On the other hand, pure coke breeze could be consumed in boilers which had been recently installed with the Wilton grate; but frequent cleaning of the flues was necessary, and at times there was a considerable loss of fuel in the ashes. When coke breeze was added to brown coal for use in gas-producers, blockages were frequent; but the addition of coke of the size of hazel nuts prevented these happening. Smaller coke, the size of peas, gave similarly good results; and when actual breeze was given up, the efficiency of the producers was raised.

Coke dust briquetted with lignite tar as binder proved to be a very economical fuel. Roller briquetting machines answer better than stamping machines, on which the wear and tear are very heavy. When pitch is used as the binder, it should be reduced to powder, which is mixed with the breeze, and the whole mass is heated to 140° Fahr. before it is run into the briquetting press. A process brought out by the General Briquetting Company of Berlin atomizes the pitch when liquefied, and mixes the small particles when in the act of setting or solidifying with the breeze which is to be briquetted. The briquettes thus made form a good fuel for locomotives.

It is reported by Anzböck that large coke mixed with 30 per cent. of coke breeze answers well as a fuel for heating retort-settings provided with the "Evaporator" furnace. Teodorowicz reports that the Kudlicz furnace presents the advantage of producing no solid clinker containing combustible matter. Vaigl thinks that the most economical utilization of fuel will be secured if low-grade fuel is consumed in central gas-producers, whereby a quantity of large coke will be set free for sale at good prices. Coke-breeze can also be used as fuel in brick and tile works.

At a general meeting yesterday week of the members of the Royal Institution, it was announced that (among others) Mr. Charles Hawksley, M.Inst.C.E., has been nominated as a Vice-President for the ensuing year.

Commenting on the Summer Time Bill to the Sheffield correspondent of the "Engineer," Mr. Hanbury Thomas, the Managing-Director of the Sheffield Gas Company, expressed the opinion that the Bill was overdue, and added that two years ago the Company estimated that such a measure would mean 8000 tons of coal less during the summer months. Now, of course, the volume of gas being consumed is very much greater; so that the economy resulting from the measure should be proportionately more. Some of the Directors of the leading Sheffield steel-works extend, it is said, an equally cordial welcome to the innovation. "Its value at a time when economy is a national gospel cannot be over-estimated," said one. Another remarked that the only question was as to whether the proposal should not have been for two hours instead of one.

THE YEADON AND GUISELEY GAS COMPANY'S UNDERTAKING: THE OLD AND NEW PLANT.

By J. E. LISTER COOPER, of Yeadon.

[A Paper read at the Yorkshire Junior Gas Association, May 6.]

The Yeadon and Guiseley Gas Company was formed about 1846; but little progress was made until about 1870. Since that time, the make of gas, coupled with the amount of capital expenditure, tabulated in decennial periods, will serve to indicate the need for extensions in order to keep abreast of requirements, and will also show the financial position of the Company for embarking on a scheme of this magnitude, which, for a country works of approximately 100 million cubic feet, was a large undertaking.

Year.	Make Cubic Feet.	Capital Expenditure.	Capital Expended per Million.
1870	14,953,000 ..	£20,493 ..	£1,370
1880	37,200,000 ..	30,721 ..	825
1890	59,025,000 ..	41,140 ..	697
1900	81,140,000 ..	49,482 ..	610
1910	108,104,000 ..	62,728 ..	580

At the end of the year 1915, after bearing the cost of the new plant, the amount of capital expended was £70,695, for a make of 122,065,000 cubic feet, or £578 per million manufactured.

The district is partly manufacturing and partly residential; cottage property largely predominating. What the exact area of the district is I could not say; but it is extensive, needing 31 miles of mains to supply a population of about 18,000. We have 2250 ordinary consumers and 2020 prepayment meters. The average daily output in mid-winter is about 500,000 cubic feet.

In 1913, the old carbonizing plant, which had been in use for twenty years, was getting worn and inadequate. Labour costs in working it were very heavy, as a subsequent statement will show. These, and other considerations, which I will not dwell upon, made it necessary either to improve the old plant—build new plant in the old house—or erect entirely new plant, including a new house. The old retort-house was found to be unsuitable, both as regards width and light, so eventually, on the recommendation of my late chief (the late Mr. E. Lister), the scheme which I am about to describe was adopted—chiefly, I think, on account of consideration of the matter of capital cost.

The plant consists of a steel framed retort-house averaging 121 feet long, horizontal stage-floor retort-bench, consisting of eight through beds of eight retorts, stoking machine, with generating plant, and coal and coke handling plant.

THE SITE AND FOUNDATIONS.

The only site available was one which had been used as a tip for refuse, situated south-west of the old retort-house and coke-shed. There was a rapid fall in the original level of the ground from one side to the other; and the difficulty in getting good foundations was in consequence increased, and necessitated about 2000 cubic yards of excavation. In order to bring the surface of the bench foundations to a level 8 feet below the datum level, 660 yards of concrete were used. The foundations of the house absorbed 120 cubic yards, and the breaker pit and motor for the coal plant required 40 cubic yards. The amount of concrete used in the foundations, apart from those for the generating plant and floors, was 820 cubic yards.

The bench foundations, which are rather interesting, are 93 feet long by 24 feet wide, and vary in thickness, being stepped according to the nature of the ground; the greatest depth being about 9 feet, and the least about 4 feet. A large raft of concrete was first formed, averaging about 2 feet in thickness, and concrete pier walls, 3 feet thick, were formed immediately under the pier and end walls of the bench; the space between being filled with rubble and excavated earth. This formed centres for concrete arches. The whole area was then covered with a solid raft of concrete, 2 ft. 6 in. thick, which was reinforced with strong wire network. There has not been the slightest sign of subsidence.

The whole of the earth on the charging side was not excavated; but a retaining wall was built, leaving a subway 8 feet wide, which is ample width to allow room for the adjustment of the dampers and slides.

RETORT-HOUSE.

The retort-house is 64 feet span, 123 feet long on the charging side, and 119 feet long on the discharging side. The wall on the charging side is built upon an existing retaining wall, and is 28 feet high to the eaves. On the discharging side, the height is 38 feet from the level of the clinkering floor to the eaves. The walls are 14 feet thick to the stage-floor level, and set off by plinth bricks to 4½ inches in the panels between the stanchions, around which are pilasters 9 inches thick.

The strength of the building consists of 10 in. by 5 in. R.S. stanchions at 10-inch centres, braced horizontally by 4 in. by 4 in. by $\frac{3}{8}$ in. T steel every 5 feet in height, and at the eaves by 8 in. by 5 in. R.S. channels, and fitted with steel clips for fastening the roof rafters. The building is further braced by double angle struts forming part of the roof principals; being continued down to the stanchions, and also diagonally across the corners, by double angle struts, secured to the side and end stanchions.

The roof principals are eleven in number, and are fixed immediately over the stanchions by means of steel clips. The rafters are of 6 in. by 6 in. by ½ in. T steel-tension rods 5 in. by $\frac{11}{16}$ in.

from the shoes to prince posts, and 5 in. by ⅛ in. from prince to king post—the king post, queen posts, and prince posts 3½ in. by ⅝ in. flats, and diagonal stays 4 in. by 4 in. by ½ in. T steel. The roof principals are braced together by angle steel wind-ties. The purlins are 2 in. by 2 in. by ¼ in. steel angles 10¾ inches apart, secured to the back of the rafters, inside of the angle upwards, slated by Duchess slates fastened by lead nails. A ventilator, 9 ft. 6 in. wide, extends almost the full length of the house.

The stage floor on the discharge side is of 10 in. by 5 in. R.S. joists, secured to the house stanchions and resting on steel rollers in brackets fixed to the bench buckstays. These transverse joists are supported in the middle by 8 in. by 5 in. vertical joists, and are framed together by three lines of 8 in. by 5 in. joists and two lines of 8 in. by 3½ in. channels running longitudinally. On the charging side are 10 in. by 5 in. cross joists over the subway, trimmed with two rows of 10 in. by 6 in. R.S. joists under the machine. The remainder of the charging floor from the subway wall to the house stanchions is spanned by 9 in. by 4 in. R.S. girders, which support one of the machine rails. The space between the floor joists and channels is filled in with concrete 9 inches thick and paved with 3 inch blue brick. The clinkering floor is 2 feet lower than the top of the bench foundations, which makes for convenience of clinkering and provides a lofty cellar 11 feet high.

Retort-Bench.

The retort-bench comprises eight through beds, each containing eight retorts, 20 ft. long, Ω-shape, 22 in. by 16 in., arranged in two vertical tiers of four each. This type of setting, I believe, tends to lengthen the life of the retorts, by offering fewer obstacles to the dust carried by the producer gas, and reduces the liability of fluxing and running brickwork. The retorts are more equally heated; hence no retort is likely to be burnt out sooner than the others, as is often the case where bull'seyes are used. Of course, there are disadvantages; but these are surmounted by the advantages. The arches are semi-circular in shape, and on 8 ft. 9 in. centres. Each bed has a furnace on the discharge side only. The regenerators are Brooke's tubular type. The main flue is central and connected to the chimney, which is independent of the house. This is 70 feet high from the foundations; the shaft being 4 feet square inside.

The furnaces are provided with steam as well as water, and are fitted with ordinary channel bars and water troughs with drip plates, and allow for a fuel depth of 4 ft.

The bench is braced by 12 in. by 6 in. R.S. joists in front, nine in number, and on the charging side extended upwards to carry the coal hopper joists, which are 14 in. by 6 in. These tie the buckstays to the house stanchions, where they are supported on 8 in. by 5 in. joists bolted to the flange of the house stanchions and secured at the bottom by concrete foundations and footplates. The buckstays on the discharging side and the cross joists are 10 in. by 5 in.; the latter being extended to the house stanchions with 6 in. by 5 in. stays.

The hydraulic mains are supported on two lines of 5 in. by 3 in. R.S. joists resting on the cross joists, tied together by 3 in. by 3 in. T steel bolted to the top flange. The ascension, arch, and dip pipes are 8 inches diameter, and are on the discharging side only.

The hydraulic mains are of steel, and separate from each other. They are 2 ft. 6 in. wide, 12 inches deep on one side, tapering to 2 feet on the side where the tar is drawn off. Only 2 feet of the width is utilized as gas space; the remaining 6 inches being separated by a cast-iron plate which is carried below the dip-pipes, forming a continuous lute the full length of each main, for cleaning purposes. An overhead cistern is fixed on the inside gable wall of the house, into which liquor is pumped, and from which it gravitates to each hydraulic under separate control.

The gas take-off from the top of the hydraulic is 10 inches in diameter, fitted with Peets valves direct into an 18-inch foul main. Each hydraulic has a 6 inch tar outlet falling at various angles to the tar-main, which falls towards the tar-tower about 1½ inches in the length of each bed. This fall is accelerated just prior to the inlet of the tar-tower. The tar-tower is of steel, fitted with seal regulating valve and syphon overflow, and, being outside, is coated with a compound for resisting low temperatures. The gas from the 18-inch foul main passes through two retort-house governors, 8 inches diameter, which may be used separately or in conjunction, and then, by means of a steel foul main, to the condensers.

Coal Plant.

The coal plant comprises a 7-ton receiving hopper, from which the coal passes, by a shoot, to a sliding tray, which is worked with a reciprocating movement by an adjustable crank driven by spur-gearing and fast-and-loose belt. This maintains a regular supply of coal to a four-roll coal-breaker capable of dealing with about 30 tons per hour. It is but rarely that an empty bucket is to be seen when the elevator is working.

The elevator is on the closed principle, about 48 feet centres, which, when running 100 feet per minute, deals with 20 tons per hour. The buckets are of cast malleable metal, fitted with steel skidder bars, and are 16 inches wide and set 2 feet apart. The framework of the case is fitted with renewable steel plates for the skidder bars to slide upon. The elevator head is fitted with an angle shoot for delivering the coal to a conveyor. The coal falling upon this shoot was found to make much noise, to minimize which, two 2 in. by 2 in. angle irons were bolted across the interior of the shoot, just where the coal dropped. This has proved a most effective silencer, by means of the cushion formed by the accumulation of small coal in the angles.

The conveyor is of the push-plate type running the full length of the bench. The trough is 16 inches wide, formed with two 6 in. by 2½ in. channels riveted to the bottom plate, which is ¼-inch thick. The top flanges of the channels are fitted with renewable flats. The trough is fitted with sixteen slide doors, to give access to the coal-hoppers. All the plant is driven by a 20-H.P. motor. From the main shaft of the motor is a belt-drive to a countershaft in the breaker pit, for driving the breaker and automatic feed countershaft. The main shaft is continued through the elevator casing, and is fitted with bevel gear, driving an inclined shaft, keyed to the top of which is a bevel pinion geared into a bevel wheel for driving the elevator. Lower down on the inclined shaft is another bevel pinion, which engages with a mitre wheel for driving the conveyor countershaft, which drives the end shaft of the conveyor by means of reduction gear.

The coal-hopper is continuous the full length of the bench and divided into eight separate chambers, one for each setting. Each hopper has four outlets, and is fitted with two sliding doors for discharging the coal into the machine hopper. These doors are operated from the machine. In connection with this, we have a contrivance which makes it impossible to travel the machine unless the hopper door is closed; thus avoiding the risk of a hopper emptying itself upon the retort-house floor. The capacity of each hopper is 36 hours for each bed.

Power House.

The power-house, which is built on the south-east side of the retort-house, is of brick reinforced by steel framework in uniformity with the retort-house. It is 28 feet long, 21 feet wide, and 11 ft. 6 in high. In this house is situated the power for driving the whole of the plant. This consists of two gas-engines, each of 60 H.P.; each engine being capable of taking the full load easily. Along one side of the house is fixed a countershaft. Each engine drives half of the shaft, or, by operating a clutch, the whole length may be driven by either engine, thereby enabling either generator to be driven by the engine of the other set. The generators are of 40 KW., for the generating of current at 220 volts, Siemens compound wound.

Stoking Machinery.

The stoking appliances have some novel features. The machine is a combined one; but the combination for a projector machine is somewhat unusual—I think I might say unique—in so much as the charger and discharging ram are both on the same centre. The operation of charging the retort after discharging and withdrawing the ram is carried out through the pusher head without travel or resetting the machine.

The charger is Toogood's patent, with which most members will be familiar. The charge projected by the machine possesses a very useful and desirable characteristic, in as much as it is stratified; the slack and small coal lying on the bottom of the retort and the lumps on top. This, of course, is advantageous, quickening the burning-off of a charge. The open formation of the lumps allows easy passage for the gas from the densely-lying slack, which, being in close contact with the bottom of the retort, absorbs the heat first by conduction, and also allows the radiant heat from the top of the retort to penetrate the charge better. The coke is very compact, which is a serviceable feature in enabling the charge to be pushed more readily, and has the tendency to reduce liability to stopped ascension pipes. Any weight of charge can be put in without readjustment of parts.

The discharging ram is also a unique feature of the machine. It consists of eight double-sided links. Each link has two vertical side plates 1 foot apart, riveted to the outside of which are teeth at equal distances, after the nature of a rack. These teeth, engaging in two sprocket wheels, afford the medium of propelling and withdrawing. When extended the links are rigid, and when withdrawn they return into the semi-circular guide-rails, 4 feet radius. The bottom edges of the vertical side plates are soled with wearing strips. The ram is silent in action, and does not show the slightest sign of warping with the heat of the retort. Power is obtained from a 20-H.P motor carried in the suspended cage for both operations of charging and discharging; the two alternate motions being made possible by clutch gear. The framework of the machine is high, to permit of stoking four tiers of retorts; but otherwise the dimensions are very compact, measuring 14 feet in depth from the sealing face of the mouthpiece, the total width being 9 ft. 9 in. The travelling of the machine and the hoisting to each tier of retorts are performed by an 11-H.P. motor supported on the main framework of the machine.

The coke from this method of working is exceptionally good; and with a view to preserving the quality, special coke-handling plant has been installed. It consists of eight pairs of quenching chambers erected in front of the bench underneath the discharging floor. These receive the coke from the mouthpieces, where it is quenched with a spray formed of 2-inch diameter tubing fixed in the top of each chamber, having a plug cock and lever to each compartment.

The dimensions of each chamber are 9 ft. 9 in. long 3 ft. 5 in. wide and 3 feet deep, formed of ¼-inch plate, and has a capacity of 14 cwt. of coke per chamber divided into two compartments. Each compartment is fitted with hinged lids on top, and with quadrant doors underneath. The chambers are supported by means of angle pieces on the floor joists and channels.

The quadrant doors are easily operated for discharging the coke into trucks, which run on lines in the subway. These are hoisted by means of a 2-ton electric hoist from the subway level to a gantry 15 feet above the coke-store level.

Working Results.

The author also gave a series of interesting working results; but owing to some of these being of necessity based on estimates, it was desired that they should not at present be published. Mr. Cooper, in conclusion, said he hoped at some future time the Directors of the Yeadon and Guiseley undertaking would entertain the members at their plant, if the Association should think the works worth a visit.

DISCUSSION.

The President said there were various points in the paper which members might think worth special comment.

Mr. Peter M'Nab (Low Moor) said, as the number of prepayment consumers nearly equalled the ordinary in the undertaking, there should not be many bad debts. He asked if there was any extra charge, or a stipulated amount, to be paid for by this class of consumer. Considering the capacity of the retorts, with only 8-inch outlet, did Mr. Cooper find much "scurf," or many stopped pipes? Perhaps a short description of the method of controlling the supply of liquor from the overhead cistern would be interesting. Was the flow continuous, automatic, or only used for flushing? Was the holder capacity as liberal as the carbonizing capacity? Could the author tell them what caused the difference in "make" per ton during December, as compared with June, 1915? Were the items in regard to wages in the working results full or part wages? If they were full, and including about 30 per cent. increase, labour must have been cheap in his district when working the old system, contrary to the experience of most large works.

Mr. W. W. Atley (Normanton) said he would like to ask Mr. Cooper if he ever had any breakdowns in his stoking machinery. So far as he understood, the author had only one stoking machine. With all his eggs in one basket, did he often have to have resource to hand charging? Also, did he find much dust in the projector type of machine? At his own plant at Whitwood they used washed coal, and had an entire absence of dust, though occasionally, when charging the bottom retorts, there was some smoke. The author, it appeared, clinkered the furnaces every 48 hours. This seemed a long time, unless they were using a very good class coal. Could Mr. Cooper possibly give the amount of acids in the coal or coke used?

The President said Mr. Atley had raised an interesting question in regard to clinkering. He (the President) should also like to know how the author went so long without clinkering. There was, indeed, a works neighbouring his own which, he understood, went several days without clinkering; and he had often wondered how they did it. In his own case, they could only go 24 hours; and this was with a very good coal. One thing which had struck him was the rather large gas consumption per consumer in Mr. Cooper's case. In his own case, it was somewhat low. He supposed the reason in Mr. Cooper's case was the heavy use of gas by mills.

Mr. Cooper: Yes.

The President (continuing) said when they considered capital cost according to the number of feet sold, they must not lose sight of their dividend-earning capacity. The saving per ton of coal in the author's case struck him as being a little too high; but no doubt with Mr. Cooper's modern plant, he should not have much difficulty in getting it.

The Hon. Secretary (Mr. E. Garsed) said that the only point on which he was going to comment, after seeing the paper in advance, had been, he now found, eliminated by Mr. Cooper. Seeing that figures were not to be published, he felt he might venture a few particular remarks on them. Mr. Garsed then proceeded to make certain comparisons on this ground. Concluding, he said his comparisons did not materially alter the effect of Mr. Cooper's paper. He understood Mr. Cooper to say the travelling wheel of the machine was flanged on the side farthest from the retort.

Mr. Cooper: No, the wheel which was farthest away from the retort.

Mr. Garsed (continuing) said he had wondered if the author had ever had his machine leaving the wheel. Also, he would like to know the material used in covering the tar-tower.

Mr. Chas. Roper (Bradford) said, in regard to the point raised by Mr. Atley, he thought the question of how they described the coke saleable—whether they referred only to that for sale or included that used on the works—was one of the things in regard to which a standard method of calculation should be set. In his own case at Bradford, the coke saleable was that sold, for which money was received.

Mr. E. J. Sutcliffe (Bradford) said the author stated that one of the reasons for adopting the stoking machine, &c., was the heavy labour cost, and, later on, the gas costs. He would like to know the type of carbonizing plant he had. There seemed to be no reference in the paper to this. If it was hand work, the author's figure seemed remarkably low. He knew cases of very much larger works than those at Yeadon where the carbonizing costs were very considerably higher in winter, and were small in summer. The author remarked that the coke was very compact—a serviceable feature in enabling the charge to be pushed more readily, and had the tendency to reduce liability to stopped ascension pipes. He would be glad if Mr. Cooper would give any reason for this statement. One other point was, Did he fill his retorts?

Mr. Cooper, in answer to Mr. Sutcliffe's last point, replied in the negative. There would not be room to draw the retort by hand with a hook-head. If they put in 32 cwt. of coal per day, the retort would be almost full. As to Mr. M'Nab's query, there were not many bad debts. The leakage for every half year was a fraction. There was a stated charge for slot meters. As to the capacity of the retorts, the 8-inch outlet seemed to be ample. They had very little trouble with stopped pipes. He certainly thought scurfing was rather heavy. In respect of the method of dealing with the liquor into the hydraulics, they had a main liquor-pipe running the full length of the bench, with an outlet to each hydraulic, with a clack on it, and all except the one being flushed were kept closed. The hydraulics were flushed once in every shift. In regard to the capacity, they had plenty of carbonizing plant; but the holder storage was not so liberal. In reference to the difference in the make between December and June, they could always do better when on the minimum make than on the maximum make, which he thought was largely due to the passage of the gas through the condensers. They were somewhat restricted. The bye-pass pipe of the condensers had been laid about forty years, and was dead-level. They had to be getting down to it about once a week to clear the tar. During the coming summer, they were going to lay a new main right from the condensers to the scrubber. This would be their remedy he thought. After a reply to the points raised by some speakers on comparative wage payments, Mr. Cooper informed Mr. Atley that the plant had only really had one breakdown—when they had to resort to hand stoking, and they left the top retorts uncharged. There was a triple pedestal on the machine, in which the shaft ran, driven by a Renolds chain off the clutch shaft from the main. The shaft which drove the ram ran through this triple pedestal; and on one occasion the pedestal was damaged. They had a spare pedestal; but they found it was about half-an-inch too deep, and it had to be planed off. This meant more delay; and so they had to resort to hand stoking. Otherwise, they had not found anything serious. The amount of dust from the machine was, for a projecting machine, remarkably small. In regard to clinkering, they had a good coal—from the Normanton district; and they seldom found a large piece of clinker. They used a good deal of steam; but this was rather liable, while keeping the bars clean, to drive up into the furnace. They clinkered, of course, every three hours. In regard to costs of carbonizing, he thought Mr. Atley, in his figures, had not included wear and tear changes.

Mr. Atley: That is so.

Mr. Cooper, proceeding to reply to points raised on the cost per ton of coal, said his figure was somewhat of an estimate, and any variation was in the reduction of the amount used in the furnaces. They had only had twelve months' experience of the new machine. Wear and tear had been next to nothing so far. Mr. Garsed had raised a query as to the constitution of the tar-tower covering. It was very difficult to say what it was. He thought there was some magnesia in it and some lime, and the remainder seemed to be manure. It was a patent compound. It was very cheap. In regard to Mr. Sutcliffe's remarks, of course wages were low. But when they referred to the wages per 1000 cubic feet, it came up very much. As regarded the compact coke, he thought compact coke and a charge of slack at the bottom would largely minimize the likelihood of stopped pipes. On his plant, they had never found any tough tar in a stopped pipe. It was generally a bit of dryness; but very little of that.

The President said he was glad to note the presence of Mr. E. H. Hudson, of Normanton, representing the Manchester Institution, and invited him to say something on the paper.

Mr. Hudson, after remarking that he had not heard the paper in full, said the discussion had raised one or two points upon which he might express an opinion. He thought one very important thing was that of uniformity of method of compiling statistics. It had been said in the paper, he believed, that the coke used for the boilers was included in the coke sold. This was very misleading, because they might use 5 cwt. for power at the works, which would leave a very low really saleable quantity. In glancing through a copy of the paper, he noticed credit was taken for the extra gas yield at the selling price. This, to his mind, should be at the cost price, because they must remember that if they did use an extra quantity of coal in order to produce this yield of gas they would also have the bye-products to sell, which would reduce the actual cost of the coal. But the paper seemed to take advantage of the selling price of the extra yield. There was another factor which must be taken into account in putting in new plant. There was no debit in these comparisons for dismantled plant. It was all very well to be modern; but if they had plant that was doing really good work, they must debit to the cost of the new plant something for that which they were discarding. He thought the point as to the method of compiling statistics should be carried further in the Association, and a definite method established. In regard to data, he thought the author had taken the cost of the gas used in the engines. They would be perfectly justified in taking this cost as the net cost into the holder, as the cost of running the gas-engines.

Mr. Cooper said the reason he had taken the figure he did as the cost of gas, and compared the working of 1914 and 1915, was that he was somewhat at a loss as to which cost to take—the old or the new; so he decided that the best thing would be to take a uniform amount for both. If he had taken the cost of the gas under the old plant and reckoned it as lost under the old working, he would have got more pronounced benefit still. Then, of

course, the new plant would have been shown at a disadvantage had he taken the new plant costs. The old plant would have been made better, and the new plant worse, had he taken the cost of the gas in each case alone. He had, therefore, taken a uniform price, which gave a sort of general comparison suitable for anybody to look at who was not working this particular concern.

VOTE OF THANKS.

Mr. M'NAB proposed a vote of thanks to the author.

Mr. E. GILLETT (Bradford) seconded the motion, which was carried unanimously.

Mr. COOPER, in responding, said there was one matter he had omitted to mention, and that was the debiting of the cost of the old plant, mentioned by Mr. Hudson. Of course, the cost of the old plant, so far as their present working expenses went, did not enter into consideration, because they only added the capital cost as between the old and the new plants. The cost of the old plant was covered year by year in a sinking fund.

Members afterwards inspected diagrams and blue prints which Mr. Cooper had brought for examination.

Ordinary Meeting of the Société Technique du Gaz.

M. Rouland, the President of the French Gas Society, in a circular letter to the members, writes: "It appears to your Committee that the situation again this year does not permit of the usual congress. The difficulties in which the members are carrying on their undertakings makes it impossible for some of them to get away, without mentioning those who are detained by their military duties." There will, therefore, only be the ordinary general meeting of the Society, which will take place on June 9. The agenda includes the approval of a new bye-law, the Committee's report, and the admission of new members to the Society and the Committee. Needless to say, we confidently look forward to the time when our French allies and colleagues will be holding their valuable and interesting annual meetings as formerly.

A List of Workers.

An Order in Council dated the 10th inst. makes it the duty of everyone in Great Britain employing male persons between the ages of 18 and 41 to "make and keep constantly posted up in some conspicuous place" on the premises in or about which such persons are employed, or on his own premises, a list in the form prescribed, which list is to be revised at least once a month. The exceptions are munition factories where a register of male persons is kept, and mines where employers have given lists to the colliery recruiting courts. The regulation is 41A, under the Defence of the Realm Act; and forms for posting up, showing the information to be given, will be obtainable at post offices (at which employers should apply) at the beginning of next week. When the form is examined, it will be perceived that the information which is ordered to be set down on it will assist employers in guarding against the employment of any man belonging to the Army or Reserve Forces who is an absentee without leave. Employing such a man, it is pointed out, entails liability to a heavy fine.

The "N.C.G.A." of America.

The convention held at Washington towards the end of last year, was the eleventh annual gathering of the National Commercial Gas Association of America; and the proceedings on the occasion fill a bulky volume. There was an extensive array of reports and papers to be considered; and the list printed at the end of the "Transactions" (the receipt of a copy of which we have to acknowledge) of members and guests registered at the convention, shows what a large number of gas men there were present to undertake the task, under the presidency of Mr. H. B. M'Lean—whose portrait, together with those of this year's President (Mr. Jansen Haines) and of the Secretary (Mr. Louis Stotz), forms one of the features of the volume. It will, however, be noticed from the report of the Board of Directors for the year 1915 that there were, at the time it was drafted, approximately 500 gas companies represented in the Association, or less than 50 per cent. of the total companies in the country; so that there is reason to hope for even larger attendances when the whole of the laggards have been brought into line with the more enterprising undertakings. The business meetings extended over parts of four days; and in this time some two dozen reports were presented, in addition to various papers and the delivery of two or three addresses. In short, the book is a record of much activity in a good cause.

Coal Supply of German Gas-Works.—It is reported that a meeting was held on April 18, at the Prussian Ministry of Commerce and Industry, under the chairmanship of His Excellency the Chief Director of Mines, at which arrangements were made to ensure the necessary supplies of coal to the gas-works of the country. All gas-works, it is stated, should now be able to obtain the coal they require in good time and, generally speaking, through their former contractors. Works which in future experience any difficulty in regard to their supplies are requested in the first instance to report the matter to the Special Committee on the working of gas-works, of which Herr Lempelius, the Manager of the Central Gas Publicity Bureau, is the Chairman.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Curtailment of Artificial Lighting: Coal Profits.

SIR,—The valuable editorial in last week's "JOURNAL" opens a matter of paramount national and local value, and one worthy of serious thought. You very properly call attention to the services rendered by gas undertakings to the State, and doubtless the Ministry of Munitions is capable of looking after its particular requirements, and seeing to it that the proposal of the Board of Trade is not prejudicial in this direction.

The official announcement that "at the present time coal in Europe is to a considerable extent a British monopoly," is opportune; but it is claimed in some quarters that monopolies without State regulation are pernicious. The monopoly of gas, which employs a capital of £140,000,000, being subject to parliamentary control, the profits on the purchase and treatment of raw coal are so regulated that public benefit is the one and only consideration. The same can be said of electrical undertakings.

In regard to the Central and District Coal and Coke Supplies Committees, appointed on the nomination of the various Coal Owners' Associations (federated for the purposes of regulating output and prices), it is believed that these Committees consist wholly, not mainly, of coal men. One of their duties is to make recommendations with a view to greater economy in the use of coal. By section 4 (1) of the Price of Coal (Limitation) Act, coal owners are permitted to get whatever price they can for export coal; and those in the know admit "fabulous" prices. Naturally another 3,000,000 tons, if diverted from lighting, would probably add an amount to coal owners' profits in one year greater than the whole capital employed in the gas industry.

No one will dispute the national benefit of setting-off exports against imports; but the practical effect of the recommendation to divert from public benefit for private gain should be answered, and a demand made upon the Government for control over the profits on export coal and a proper administration of the existing legal position, and an automatic relationship between profits on export coal and "coal supplied for domestic or household purposes to any person and coal supplied for any purpose to any local authority, or to any undertakers supplying gas, water, or electricity in the locality in pursuance of authority given by an Act of Parliament, or by an Order confirmed by, or having the effect of, an Act."

It is proper to conserve the home consumption of coal for everybody to do with raw coal what gas undertakings are striving to do in its distillation—*i.e.*, to use it up to the last ounce of benefit. The incidence of the burden of coal is unfair in the matter of gas and coal prices. The poorest user has already been hardly hit, and gas shares have deteriorated by reason of reduced dividend brought about by high coal prices; and a further reduction in the output of gas is very disadvantageous to capital and standing charges. A coal excess profits duty of even 100 per cent. would not adjust the matter.

Gas-coal purchasers desire contracts under the Act; vendors want to go beyond it. Undertakers must have coal, therefore are they to "compound a felony" in a breach of the Act, or fail in their statutory obligations? One is tempted to refer to this aspect of the situation in stronger, but perhaps more appropriate, terms.

To this anxiety is added the prospect of diminishing revenue through the operation of the proposed Daylight Saving Act, further aggravated by the recent proposal to restrict gas output. The situation is intolerable. The higher the export price, the greater the national asset. In principle, therefore, under a standard price for export as well as for home sales, pecuniary benefit would automatically accrue to home purchasers, and encouragement be given to economize for national purposes instead of for private gain; while profits from export would still induce the coal owner to improve the national asset, which now represents 17 per cent. of the total coal output.

The present distribution of profit arising from the national monopoly and national asset is, like the incidence of the burden, bad.

May 12, 1916. OIKONOMIA.

P.S.—On sending off this letter, I observe 55s. to be the quotation for Cardiff steam coal. It is to be sincerely hoped that the industry will not be misled by contemporary advice that "until something definite has come of this movement gas undertakings will be well advised to leave matters as they are."

Air Supply to Retort-Furnaces.

SIR,—The correspondence on the above subject hardly needs exception being taken to it, especially by anyone "keenly interested."

The tendency is to over-build chimneys in both base area and height, securing, as intended, anything from 50 to 60 per cent. more draught than is ever required; and, with such a margin as a constant, the more convenient point of control is the dampers on the outlet of the retort-settings, so that discussion on chimney draughts—whatever the fluctuations may be—can be dispensed with.

The factors of resistance—if they really exist—are commonly old and known, so much so that "*a*" and "*b*"* experience has vanished altogether, and "*c*" is far too unwelcome to allow of its operation, and its prevention is amply safegarded by the excellent advice—viz., "Attention given to feeding and clinkering the fires."

The near approach to perfection in design, as well as construction, of either furnaces, producers, or retort-settings—assuming that inclines and horizontals "came to go" and verticals have "come to stay"—has apparently reduced the control of heats to a minimum.

Adjustments of primary to secondary air supplies, is, in definitely fitting their relative proportions to damper area, and vacuum at this point of control.

Such conditions have not only been securely balanced, with the

* See Mr. Brooke's letter in last week's issue.—ED. J.G.L.

greatest uniformity in temperatures; but the same conditions have given—and are still giving—almost the same results at four different works with which the writer is acquainted.

Without any alterations whatever, these several installations have worked for weeks and weeks, under almost the same set conditions of adjustments.

May 13, 1916. CARBONIZER.

Alliance and Dublin Consumers' Gas Company.

SIR,—As a critic of this undertaking, I wish on the present occasion to be a sympathizer.

Those who are associated with public supply undertakings will, I feel sure, agree with me that during the recent unfortunate occurrences in Ireland, our sympathies are with those who have to meet the great anxieties in connection with the supply of gas to Dublin and its districts. From the meagre news that has filtered through to Great Britain, it is clear that the Directors, officers, and employees of the Dublin Company have passed through moments which will live in their memories for all time. We are quite sure, whatever may have been our views on matters relating to the undertaking, on this occasion there has been a devotion to duty, and a regard for the public interest, which will rank as matters of history in our industry. It is hoped that the task of putting things in order will be overtaken within a reasonable period, and that, in due course, the shareholders will endorse the appreciation of the efforts of those whom the Directors consider have served the Company so signally during the period of stress and trial.

I do not know if the Directors consider it politic to issue a short statement through the Technical Press, as to how matters stand; but if this is regarded as inadvisable, we shareholders will nevertheless give them our loyal support, and doubtless, in any event, a few words will be forthcoming to those who wish the Directors and officers to feel that their anxieties have been sympathetically shared.

Aldershot, May 9, 1916. R. W. EDWARDS ["NONULUS"].

Examinations in Gas-Fitting.

SIR,—Referring to the copies you give in your current issue of the questions in "Gas-Fitting," for examinations held under the auspices of the City and Guilds of London Institute, I think the Examiners would have been wise to have left out any reference to matters which are very debateable.

I refer particularly to Question 5 in Grade 1, and to Question 8 in Grade 2. With respect to the latter question, my own answer would be: "It is not desirable, and certainly very harmful, to have air and gas regulators on incandescent gas-burners—provided the suppliers of the gas have taken the trouble to test their gas for specific gravity, and get nipples made to suit."

After about two years' constant experience with the "Metro" burner (an experience which has in every way been a most pleasurable one), I can most unhesitatingly state that it is quite a mistake for a gas authority to supply burners with adjustments of any description—these being much worse than only "unnecessary." Granted facilities for regulating, the average consumer will attempt to use them, with the result that the adjustments are often inaccurate.

I can imagine a youth trained by the South Metropolitan Gas Company putting his "tongue in his cheek" very hard, if he attempted to answer either of the questions referred to.

May 11, 1916. R. B. A.

Sir John P. Hewett.

SIR,—With reference to the report in your issue of the 9th inst., of the motion against Mr. Walter H. Nockolds, we are acting as Solicitors for Sir John P. Hewett, one of the plaintiffs.

In your report, Mr. Israel (the Counsel for the defendant), in referring to the Memorandum which had been complained of, stated that it was marked "For Private Information only." This was at once contradicted by Mr. Grant, K.C., the Counsel for Sir John Hewett, as an earlier copy of the Memorandum was not so marked.

We think it right that this matter should be made quite clear.

37, *Norfolk Street, W.C.*, CHARLES RUSSELL AND CO.
May 10, 1916.

Birmingham Street Explosion.—Damage was caused to the offices of a Birmingham firm of brass founders by an explosion which was due to the fusing of an electric cable. There were several explosions; and gas from a neighbouring main became ignited. Officials and workmen from the gas and electricity departments were quickly on the scene, and worked for several hours repairing the damage, and eliminating all risk of further mishap.

Ripon and the Board of Trade Circular.—In response to the Board of Trade request to gas and electric lighting undertakings that the consumption of coal for lighting purposes shall be reduced by 10 per cent., the Ripon Gas Committee announce that, after conferring wtth the military and police authorities, they have unanimously resolved to cut off the supply of gas at the works every night, until further orders, from 10.30 p.m. to 5 a.m., and also to discontinue entirely the lighting of public lamps. Consumers are asked to turn the gas off at their meters each night.

Quality of the Gas at Portsmouth.—Reports on the testing of the gas led to some discussion at a meeting of the Portsmouth Town Council last Tuesday. Mr. Pink said they had borne with the Company sufficiently long; and he hoped they would see that an improved quality of gas was given. The Chairman of the Finance Committee, however, pointed out that the Company were placed at a disadvantage by the fact that they had had their oil commandeered by the Government, and their boats had been sunk. The Company had tried to do their best for the consumers.

REGISTER OF PATENTS.

Coin-Operated Meter Mechanism.

BROWN, W. L., of Lansdowne, Pennsylvania, and KAIGHN, J. B., of Philadelphia, U.S.A.

No. 574; Jan. 13, 1915.

This invention relates to coin-controlled prepayment gas-meters, wherein a rotary coin-carrier is operatively connected by a coin with mechanism which may then be manually set in a position to deliver a predetermined quantity of gas by turning a handle exterior to the carrier.

The coin-carrier, which is a rotary hollow cylinder having a coin-slot in one side diametrically opposed by an imperforate wall of the cylinder preventing the passage of anything diametrically through the carrier from the coin slot, is provided with a second opening, which is lateral and out of alignment with the coin-slot, for the discharge of abnormal coins.

A frequent form of attack upon apparatus of the kind to which the invention relates, the patentees point out, is to set the meter to pass gas without the actual deposit of a coin, by the employment of a minor coin suspended by a string extending through the outer coin-slot. To frustrate such attacks, it is proposed to provide sharp edges on the coin shoot or inlet slot, and co-acting edges on the coin-carrier, which come together after the carrier has turned a short distance from the position for introduction of the coin, and thus cut through the string.

According to another feature of the invention, there is provided on the casing surrounding the coin-carrier a cutting edge, or edges, at a point on the inner circumference of the casing between the coin-inlet and the coin-discharge opening—these being in addition to the cutting edges at the bottom of the coin-inlet shoot.

A further feature of the invention consists in the means whereby the coin-carrier, with the coin in it, actuates the supply mechanism of the meter. This comprises a clutch-head carrying a loop the limbs of which are spaced apart by a distance substantially greater than the thickness of the coin; so that the coin engages the loop with a certain amount of play and the coin-carrier has to be turned far enough to block the coin-inlet before the clutch head begins to turn.

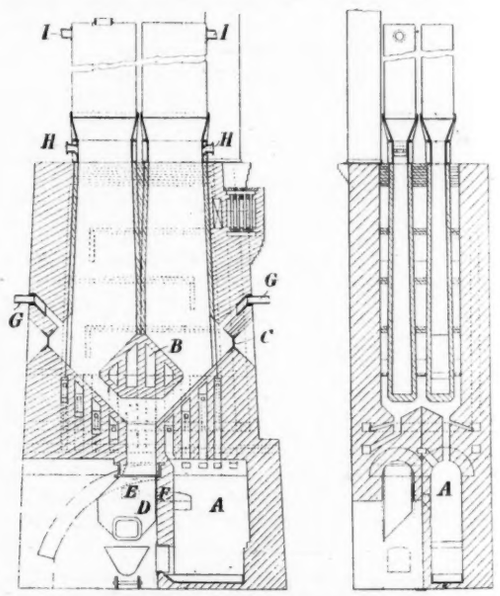
The invention includes other "novel features of construction and arrangement" not further described apart from a closely-lettered series of figures.

Manufacture of Coal Gas.

WADDELL, A., of Dunfermline.

No. 5611; April 14, 1915. No. 14,142; Oct. 6, 1915.

This process for the manufacture of coal gas consists of the following combinations of steps:—(1) Passing the coal downwards through a retort; subjecting the coal to carbonization in the retort, while so regulating the heating action that the temperature at which carbonization is effected is progressively increased from the upper end of the retort downwards; twice changing the direction, while contracting the cross-sectional area of the descending mass towards the lower end of the retort—the changing of direction being initiated before the hottest zone is reached; discharging the coke at the lower end of the retort, and withdrawing the gas at the upper end of the coal-hopper on the top



Waddell's Vertical Retort-Setting.

of the retort; and bringing the gas into contact with the entering coal, whereby tar may be condensed and return to the retort with the descending coal for carbonization therewith. Or (2) Passing coal downwards through a retort; subjecting the coal to carbonization in the retort, while so regulating the heating action that the temperature at which carbonization is effected is progressively increased from the upper end of the retort downwards; twice changing the direction, and at the same time contracting the cross-sectional area, of the descending mass towards the lower end of the retort—the changing of direction

being initiated before the hottest zone is reached; and withdrawing gas at a point towards the lower end of the retort.

It need hardly be explained, the patentee remarks, that certain of these steps are well known *per se* and in various combinations—the "characteristic of the present process being the association in a continuous cycle of the entire series of operations recited."

The illustration shows "a construction embodying the invention and comprising several retorts—it being understood that the improvements are equally applicable to single retorts"—heated externally by the producer A. The retorts rest on the arches forming the roofs of the producers, and having a number of ports through which the producer gases pass. At the lower end is disposed a flue B, of pentagonal form in section, through which heating gases are led—the sides of the flue being spaced from the walls and floors of the retort so as to form at the lower end of each retort section a section comprising oppositely inclined subsections heated all round by the producer gas; while the cross-sectional area of the passage is contracted with the change in direction.

Normally closed openings C in the retort walls permit access for poking the charge.

Exterior to, and alongside, the producers is a chamber D, into which the hot coke is withdrawn; part of it being pushed along a shoot from E to F to the producer—the remainder being cooled by steam within the chamber D. This arrangement permits of the removal of the coke in a truck travelling on a single set of rails.

Gas off-takes are shown at G, H, I—the gas being taken off at I when it is desired to employ the process first described; while it is taken off at G when the second process is to be performed. The most usual position for the gas off-take in a vertical retort is said to be at H. The charging hopper forming an extension of the upper end of each retort is so dimensioned as to be "capable of holding a charge of coal of a capacity sufficient to effect condensation of tar."

Stoking Gas-Retorts.

TERRACE, J., of Grimsby.

No. 6165; April 24, 1915.

This invention relates to apparatus for charging gas-retorts with coal, or simultaneously charging through retorts with coal and pushing-out the coke. It has for its object "to simplify the construction of such machines or apparatus, particularly the parts which are required to enter the retort, and to enable the maximum quantity of coal to be introduced at each charge."

In a practical form of the invention described by the patentee the coal-propelling means consists of an endless band conveyor mounted on a travelling machine and driven therefrom. The scoop lies immediately over the conveyor; the coal being fed into it, and being supported and fed forward by the conveyor, which may be driven at the same speed as the scoop. As the scoop completes its feed stroke, a stop-plate is advanced over the conveyor and apron plate, and held in the mouth of the retort during the return movement of the scoop.

Fig. 1 is a sectional side elevation of part of the retort charger and discharger, showing the machine end of the scoop, the endless band conveyor, part of the stop operating mechanism, winding drum, and part of the main framework of the travelling machine upon which the apparatus is mounted. Fig. 2 is a plan of the scoop and stop. Fig. 3 is an end elevation.

The scoop is constructed of side plates A connected together and maintained at the desired distance apart by arched stays or distance-pieces B. At the forward end a hinged plate is arranged for pushing out the spent charge in the usual manner. The side plates of the scoop may be formed in one continuous length or divided into sections (as illustrated) hinged together as described (for example) in connection with the conveyor or charging and discharging member of the Fiddes-Aldridge stoking machine. In this form the scoop can be wound on a drum C, which serves for advancing the scoop into the retort or withdrawing it in the usual way. Below the shoot D, which is connected with a feed hopper (not shown), and serves for depositing the coal between the side plates of the scoop, an endless band conveyor E is mounted, supported on rollers F carried on brackets G, bolted to the vertically adjustable channel frame members H of the travelling machine—the end bearings being mounted to slide in their supporting brackets and provided with screws, so that the tension of the conveyor band may be adjusted.

In operation, the coal is fed by the shoot D between the side plates of the scoop on to the band conveyor E, which is driven as the scoop is advanced over the apron or bridge-plate V into the retort. The coal the full depth of the scoop is thus set in motion in a forward direction; and as each successive supply falls between the side plates of the scoop, the forward motion given to the coal while lying on the conveyor E serves to carry it over the apron or bridge-plate into the retort mouth, whence it is pushed along the floor of the retort to the far end by the action of the coal behind, as it is fed into the retort by the endless band conveyor, and with the aid of the side plates A of the scoop, which is caused to travel forward in the usual way simultaneously with the coal. By this means, coal can, it is said, be placed evenly from end to end of the retort. When the scoop is completing its feed stroke, an automatic stop is brought forward and held in position at the mouth of the retort, so that the withdrawal of the scoop does not at the same time drag back the coal.

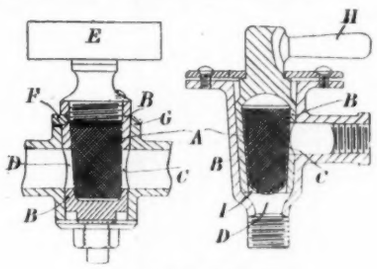
The machine carrying the apparatus and travelling in front of the retorts is equipped with usual suitable coal-feed hoppers, hoisting gear for adjusting the charging and discharging apparatus to the retorts, and other motor driven gear for operating the scoop and coal propelling means.

Taps for Gas-Fires.

GRAFTON, W., of Glasgow.

No. 10,295; July 15, 1915.

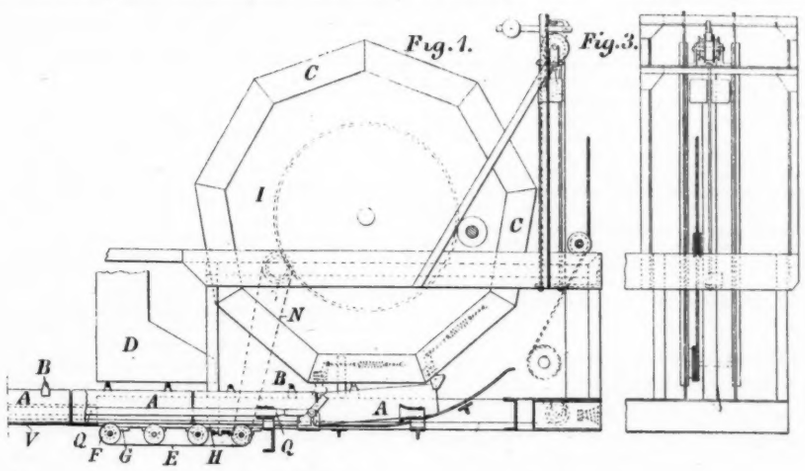
This invention, relating to taps for gas-fires, has for its primary object to provide for the removal of eddies from the gas current by the use of "a foraminous diaphragm of perforated or finely-slotted metal—such as gauze or of non-metallic material such as steatite, magnesia, or fire-clay, or of cotton wool or the like—contained within the plug member, and so interposed in the path of the gas that the gas is screened at least twice in its passage therethrough."

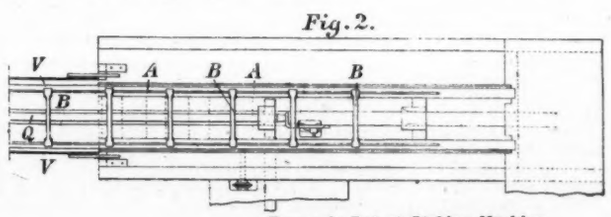


Grafton's Gas-Fire Tap.

The gauze A is preferably of open-ended form, "such as to present a complete geometrical figure." It is inserted in a hollow plug B provided with orifices C D screened by the gauze.

To permit of the insertion of the gauze, the plug member is provided with a separate wing-head E (in the first arrangement shown) for turning it. This is threaded into one end of the plug, which it





Terrace's Retort-Stoking Machine.

closely fits—being provided with an external stop-pin F adapted, on partial rotation of the plug, to abut against a shoulder piece G, so as to limit its normal movement.

According to the second arrangement, the plug is formed integral with the head, which latter is provided with a thumb lever H corresponding in function to the wing-head E. The body of the plug, which is held in operative position by a collar, is formed with a pocket I, into which is sprung the gauze," the conicity of the pocket and that of the gauze just being such as to ensure the maintenance of the gauze *in situ*."

Gas Heating-Boilers.

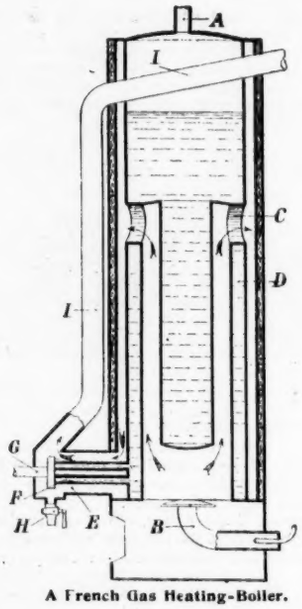
SOCIÉTÉ DU GAZ DE PARIS, of Rue Condorcet, Paris.

No. 11,502; Aug. 9, 1915. Convention date, Sept. 12, 1914.

This invention, relating to gas water-heaters, comprises means for separating water-vapour from the products of combustion.

It has been found, the patentees say, that the proportion of water vapour in the flue gases is sufficiently high to deteriorate the chimneys and affect the draught, in spite of the fact that some of the water vapour is condensed on the lower walls of the boiler. In the case of large apparatus, it is necessary either to cool completely the products of combustion and to use artificial draught, or to allow them to escape at a high temperature, which means considerable loss of heat.

According to the present invention, the products of combustion, after passing through the heating-flues of the boiler, are passed through a condenser—preferably a feed-water heater—where the bulk of the water-vapour in the gases is condensed and led off; and afterwards the cooled gases are re-heated, preferably by being passed through a hot part of the boiler, or by means of an auxiliary burner. By these means the products of combustion are freed almost entirely from water vapour; while their final temperature is sufficiently high to admit of natural draught.



A French Gas Heating-Boiler.

The heating apparatus illustrated comprises an outer casing or shell containing a boiler provided with a steam outlet pipe A. A burner B is used for heating the boiler; the combustion gases first passing in a circle round the cylindrical portion of the boiler, rising, passing through the openings C, and descending along the annular portion D. The hot gases are then admitted into a tube E, acting as a condenser, and brought into contact with a bundle of copper pipes F used for the admission of cold water passing into the boiler through the return pipe G. The condensable products contained in the gases collect at the bottom of the pipe E and give off their heat of condensation to the feed water, and can be discharged through the cock H. The non-condensing products collect in the flue I and are conveyed to the hottest portion of the boiler—*i.e.*, the steam space—where "they are heated again so as to acquire sufficient ascending power to ensure a good draught."

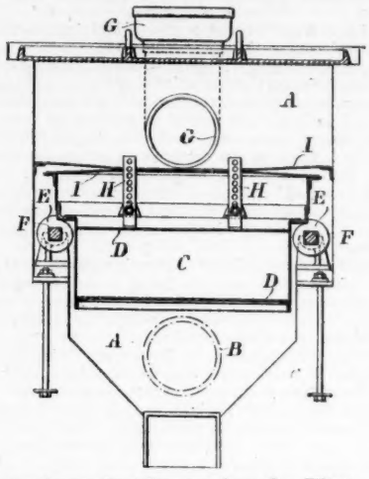
Removing Dust from Gases.

DUCKHAM, A. M'D., of Ashstead, Surrey.

No. 10,244; July 14, 1915.

The object of this invention is to provide improved means for removing dust from gases—more particularly from hot gases such as producer-gas or blast-furnace gas—by passing the dust-laden gas through a layer of slag wool, asbestos, fine steel turnings, &c., which is not liable to be destroyed by the gas and which is carried in a frame so mounted that it can be shaken to remove the dust collected by it.

An illustration is given of such a filter, consisting of a compartment A into which gas can enter from a pipe B. C is a box of which the top and bottom are formed of expanded metal D, and which is supported by cams E on longitudinal shafts F in such a way that, by rotating the shafts, the box can be gradually raised and suddenly dropped to shake-out the dust that is collected by the filtering material contained in the box. The floor of the compartment slopes down towards the middle, and a screw conveyor (not shown) is provided to remove the dust. G is a gas outlet pipe. In order that the thickness of the filtering material may be varied, the top of the box is provided with brackets H, by which it may be bolted at various heights to the frame of the box. The illustration shows it in its highest position.



Duckham's Dust Remover from Gas-Filters.

The flexible diaphragms I (secured to the walls of the compartment) close and open as the box rises and falls and effectually prevent the escape of gas which has passed round the sides of the box to the exit pipe.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for May 10.]

Nos. 6176—6555.

ARMSTRONG, J.—"Gas cooking-stoves or apparatus." No. 6479.
CHRISTOPHER, J. E.—"Washing benzol, toluol, naphtha, &c." No. 6247.
COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIAL D'USINES À GAZ.—"Coin-operated meters, &c." No. 6361.
GIBBONS BROS.—"Pot-furnaces for melting metals." No. 6176.
HALL, I.—"Gas-fired furnaces." No. 6452.
HEFFERNAN, T.—"Portable gas-lamps." No. 6412.
LEHMANN, J.—"Gas-furnaces." No. 6439.
MASTERS, R.—See Gibbons. No. 6176.
PARTRIDGE, A. E.—"Gas-stoves, &c." No. 6468.
TURNER, E.—"Gas and air, &c., regulator." No. 6447.
WHITFIELD, C.—"Carbonizing peat and obtaining distillates therefrom." No. 6534.
WINTERFLOOD, J.—"Combined gas and water valve for geysers and water-heaters." No. 6489.

Hyde Gas Company.

Mr. G. F. Drinkwater, who presided at the half-yearly meeting of the Hyde Gas Company, said, in moving the adoption of the report and accounts, that he was glad to be able to call attention to the satisfactory nature of the figures submitted for consideration, and to again congratulate the shareholders on the results attained in the face of the abnormal and difficult conditions which had prevailed. It was gratifying to note that there was a marked improvement in the affairs of the Company. During the past winter in the gas industry, and throughout all industrial circles, the difficulties experienced in obtaining adequate coal supplies had caused very serious inconvenience, and a considerable amount of anxiety. Moreover, there had been a shortage of carts, railway waggons, and labour. There had also been a steady growth in the cost of coal, stores, and wages, which had materially added to the cost of production. Notwithstanding these serious drawbacks, a trading profit had been made which would enable the full statutory dividend to be paid. This must be considered a very satisfactory result of the working for the second half of 1915. The decreased consumption of gas was only to be expected. This was attributable to the restricted public and private lighting (which had been most rigidly enforced), to the earlier closing of licensed premises, clubs, and institutions, and to economy practised by the consumers generally. The decrease would have been much greater except for the day-load increase by the use of gas cookers and fires, and gas used for industrial purposes. The new vertical retort installation was now working to its fullest capacity, and giving every satisfaction. Under this system of carbonization, the yield of gas per ton of coal had greatly increased; and the tar and ammoniacal liquor had both increased in quantity, and the former much improved in quality and strength. The new condensing plant was now in full working operation, and giving satisfactory results. The adoption of the report was agreed to.

Redditch Electricity Undertaking.—In the course of a discussion on the estimates for the ensuring year at a meeting of the Redditch Urban District Council, Mr. Wright gave the welcome intimation that "they were within measurable distance of the end of the continued heavy call on the ratepayers' pockets in support of the electricity undertaking." The estimates included an amount of £2000 "in support of the electricity undertaking."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:

Bill read a second time and committed: South Metropolitan Gas.

Bill read the third time and passed: Gas Provisional Orders.

The South Eastern and Chatham Railway Companies' Managing Committee have presented a petition against the Folkestone Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:

Bills reported: Imperial Continental Gas Association (with amendments), Local Government Provisional Orders (No. 2).

National Economy.

Colonel NORTON-GRIFFITHS on Thursday asked if the Government had taken any steps to cause the various municipal bodies to curtail all public works, with a view to national economy both in men and money?

Mr. LONG replied that many steps had been taken in this direction. Circulars urging the importance of economy both in men and money had been issued. Sanction to loans except for war purposes was being refused, and in many cases works had been suspended or stopped and contracts terminated, where the nature of the work and the stage which it had reached admitted of this being done. In most instances he had the hearty co-operation of the local authorities in his efforts to this end.

DAYLIGHT SAVING BILL.

The following is the text of the Bill introduced by the Home Secretary for bringing into force the Daylight Saving Scheme, by making, between May 21 and Sept. 30, the local time in Great Britain one hour in advance of Greenwich mean time, and in Ireland one hour in advance of Dublin mean time.

LOCAL TIME IN SUMMER MONTHS.

1.—(1) During the prescribed period in each year in which this Act is in force, the local time in Great Britain shall be one hour in advance of Greenwich mean time.

(2) This Act shall be in force in the year 1916; and in that year the prescribed period shall be from 2 o'clock in the morning Greenwich mean time on Sunday, May 21, until 2 o'clock in the morning Greenwich mean time on Sunday, Oct. 1; and His Majesty may in any subsequent year, by Order in Council made during the continuance of the present war, declare this Act to be in force during that year, and in such case the prescribed period in that year shall be such period as may be fixed by the Order in Council.

(3) Wherever any expression of time occurs in any Act of Parliament, Order in Council, order, regulation, rule, or by-law, or in any deed, time-table, notice, advertisement, or other document, the time mentioned or referred to shall be held, during the prescribed period, to be the time as fixed by this Act:

Provided that where, in consequence of this Act, it is expedient that any time fixed by any by-law, regulation, or other instrument should be adjusted, and such adjustment cannot be effected except after the lapse of a certain interval or on compliance with certain conditions, the appropriate Government Department may, on the application of the body or person by whom the by-law, regulation, or other instrument was made or is administered, make such adjustment in the time so fixed as in the circumstances may seem to the Department proper; and if any question arises as to what Government Department is the appropriate Government Department, the question shall be finally determined by the Treasury.

(4) This Act shall apply to Ireland in like manner as it applies to Great Britain, with the substitution, however, of references to Dublin mean time for references to Greenwich mean time.

(5) Nothing in this Act shall affect the use of Greenwich mean time for purposes of astronomy or navigation, or affect the construction of any document mentioning or referring to time in connection with such purposes as aforesaid.

SHORT TITLE.

2.—This Act may be cited as the Summer Time Act, 1916.

HORNSEY AND NEWCASTLE GAS BILLS.

The Committee of the House of Lords, presided over by the Marquis of Bristol, who commenced their sittings last Tuesday, had the Hornsey Gas Bill and the Newcastle-upon-Tyne and Gateshead Gas Bill in the group of Bills with which they are dealing. The opposition to both measures, however, has now disappeared; and the Bills will come before the Unopposed Bills Committee in due course.

GAS PROVISIONAL ORDERS.

The Bill to confirm Provisional Orders relating to Fleetwood Gas and Long Eaton Gas was last Tuesday sent forward for third reading by the Unopposed Bills Committee of the House of Lords. The Fleetwood Order authorizes the Fleetwood Gas Company to pay 5 per cent. instead of 4 per cent. upon money borrowed in respect of the undertaking, with the consent of the Board of Trade. The Long Eaton Order legalizes the use of certain lands for the purpose of gasworks owned by the Long Eaton Gas Company.

ABERDARE AND ABERAMAN GAS BILL.

HOUSE OF LORDS COMMITTEE.—Tuesday, May 9.

(*Before the* MARQUIS OF BRISTOL, *Chairman*, *Lord* DYNEVOR, *Lord* GRIMTHORPE, *Viscount* FALKLAND, *and Earl* DIGBY.)

This Bill, promoted by the Aberdare and Aberaman Gas Company, seeks powers to raise additional capital, to issue redeemable stock, to adopt the sliding-scale and the calorific value test, &c. The only opponent was the Aberdare Urban District Council.

Mr. HONORATUS LLOYD, K.C., Mr. SHAW, K.C., and Mr. SZLUMPER appeared for the promoters. The Aberdare Council were represented by Mr. W. B. CLODE, K.C., and Mr. TYLDESLEY JONES.

Mr. HONORATUS LLOYD, in opening the case for the Bill, said that in 1869 an Act was passed incorporating the Company and authorizing the acquisition of an existing limited Company. The capital of the Company was £30,000 with a 10 per cent. maximum dividend, and £7500 loan. In 1874, Parliament sanctioned a further £10,000 capital, to be issued as ordinary or preference stock—*i.e.*, 7 per cent. ordinary or 6 per cent. maximum if issued as preference, with share capital of £2500. The whole of the £30,000 authorized under the original Act had been issued, together with the £10,000 authorized in 1874, which had been raised at 5 per cent. ordinary instead of 6 per cent. Of the original loan capital of £7500, the amount issued was £5000 at 4 per cent., as well as the £2500 authorized in 1874. Thus the total capital raised was £47,500. The business of the Company had increased very rapidly. In 1869, there were 400 consumers. By 1874 the number had increased to 700; but in 1915 there were 2300 ordinary consumers and 2600 slot consumers. There were also 600 public lamps. These increases had taken place notwithstanding the Council undertook the supply of electricity in 1912—the mileage of mains now being 35. At the same time, the district was subject to considerable subsidence, which increased the cost of manufacture owing to the large percentage of leakage. Notwithstanding this, however, the prices charged in Aberdare were moderate compared with the prices charged in neighbouring districts. In 1869 the price was 5s.; and it had varied until in 1915 it was 3s. 6d. In October last year, it became necessary to increase the price, and it was raised to 3s. 9d. But subsequent events had shown that this was insufficient to meet the extra cost of manufacture brought about by the conditions of the past two years. To meet these increased costs, the present charge should be 4s. 3d. It was a fact that the Company had not been to Parliament since 1874, though, strictly speaking, they should have done so. He would explain how they had gone along. The Company had £2500 unexpended borrowing powers; but although the capital issued was only £47,500, the actual capital expenditure had been £89,209. This had been obtained by drawing on the excess revenue, although it was not quite the usual method. This policy, however, had been partly at the expense of the consumer of the past and partly at the expense of the shareholder. At the same time, the present consumer was getting the benefit; for the capital expenditure out of revenue had enabled gas to be manufactured more cheaply than if the capital had been a charge on the undertaking. The Company, by dealing with the surplus revenue in this way, had not paid the maximum dividends they were entitled to pay; the amount of dividend not paid in this way being £17,600. He agreed that this was not in strict accordance with the statutory principles of finance; but the present consumer was in a much better position in consequence. Enumerating the main objects of the Bill, Counsel said the first was to consolidate the capital by turning the 10 per cent. shares into 5 per cent. stock—a common proposal in Gas Bills, and one which injured neither the shareholder nor the consumer, as the number of shares was just doubled and the yield halved. Thus the capital charges remained the same. It all, of course, depended upon whether the standard price was a fair one. At present, the Company was a maximum-price undertaking. Another object of the Bill was to adopt the sliding-scale; and it would be suggested to the Committee that a fair standard, having regard to the times in which we are living, would be 4s. 3d. To this, however, the Aberdare Local Authority—the only petitioner against the Bill—objected, on the ground that it was excessive. The next proposal of the Bill was with regard to additional capital—this amounting to £53,833, including borrowing powers. In addition, it was proposed to take powers to issue redeemable debenture or preference stock. This matter had already been raised on the Plymouth Gas Bill [see "JOURNAL," *ante*, p. 40], and was also being raised on a number of other Bills this session; and some kind of understanding had been arrived at for waiting until the Lord Chairman and the Chairman of Ways and Means had settled a form of words which would be applied uniformly to all the Bills affected. Another proposal of the Bill was to substitute the calorific value test in substitution for the illuminating power test. This was in accordance with modern practice. There had been some objection on the ground that the figure adopted was not the usual one—viz., 475 B.Th.U.—but had been altered to 500 B.Th.U. Next came the suggestion, by clause 64, to alter section 46 of the Act of 1869, by which gas had to be supplied to the public lamps at a price not exceeding the lowest figure charged to any private consumer. It was now felt that this was unfair, having regard to the fact that the 1869 Act was passed at a time when gas was only supplied for lighting purposes. Now, so much was supplied for power at very low rates that it was unreasonable for the Local Authority to be able to claim a supply for public lighting, as they could, at the lowest rates for power. It was therefore suggested that the Local Authority should be supplied with gas for public lighting at the lowest rate charged to any other consumer for lighting. If not, it would have the effect of preventing the Company from expanding their power business. Some interest was added to this by the fact that for this power business the Company were in keen competition with the Local Authority, who owned an electric supply undertaking. Finally, clause 65 sought to repeal section 30 of the Act of 1869, under which the Council could give six months' notice in writing at any time of their intention to purchase the Company's undertaking. As this power had been in force for nearly fifty years, and had not been put into operation, the Company felt it

would be fairer that it should be repealed, and that the Company should no longer have to work under the cloud of such a purchase clause. Coming to the petition of the Aberdare Urban District Council, Counsel first dealt with the objection to the 4s. 3d. standard price; the argument of the Council being that it would enable the shareholders to receive a higher dividend than 10 per cent., working on the basis of the 3s. 6d. price charged up to October, 1915. This, however, was quite fallacious, because the 3s. 6d. charge was no longer made. The price at present was 3s. 9d., and, in the view of the Company's advisers, would shortly have to be 4s. 3d.; so that the advantage to the shareholder which it was said would accrue would entirely disappear. Then it was said that the new capital powers were excessive. It was claimed that a testing-station should be placed in the centre of the town, instead of at the works as at present; it was asked that the pressure of 8-10ths should be increased; and objection was taken to the proposals to modify the public lighting charge and to repeal the purchase clause. Complaint was further made that the revenue of the Company had been improperly applied—a matter which had been explained to the Committee; and it was suggested that the future management should be inquired into, although he failed to see how the Committee could very well do this.

Mr. *A. E. Davey*, the Manager and Secretary to the Company, said that the actual number of consumers to March 31 last was 4911. The signs pointed strongly towards heavy increases in the cost of production in the near future; while another factor which told against the Company was the large loss by leakage—viz., about 22 per cent.—due to subsidences owing to the character of the district. This represented between 8d. and 9d. per 1000 cubic feet sold. Coal now was costing £3900 per annum more than before the war; wages this year would be increased by £1500; and the cost of materials had gone up by £1000 per annum. The increased revenue due to the extra 3d. per 1000 cubic feet imposed last October only brought in £950, against the £5500 increased expenses mentioned. It was for these reasons that an increase of price to 4s. 3d. was regarded as necessary. The Company had also been hit in the return for residuals, for though coke had fetched better prices since the war, tar, which usually was sold for £2 per ton, now only sold for 10s. per ton, or something less than ½d. per gallon. A testing-station in the centre of the town would be quite unnecessary and a needless expense; while the Council had never yet asked for a test at the works.

Mr. CLODE, for the Council, offered to pay half the cost of the central testing-station, which would only amount to £100.

Mr. SHAW, for the Company, would not accept the offer, contending that the usual place for the testing-station was at the works.

Mr. CLODE: I make the offer to pay the whole cost.

Mr. SHAW: I am instructed that it is most inconvenient to have two testing-stations.

Mr. CLODE, cross-examining witness, made a great point of the financial policy of the Company in the past. He put it that the revenue spent on capital account was not shown in the accounts, and that it was not until 1915 that the accounts suddenly showed capital expenditure amounting to £36,900. The accounts in which this item appeared were published after the Council's petition against the Bill had been deposited.

Witness explained that the change in the form of accounts was due to expert advice which the Company had had. Prior to this, the Company's Auditor had never called attention to the fact that the Company were acting against the general principles laid down by Parliament. At the same time, there had never been any concealment of what was being done with the revenue so applied, and it was obvious on the face of the accounts to any ordinary accountant.

Mr. CLODE, dealing with the proposed standard price, put it to witness that it was most unfair to base a standard for at any rate 12 or 14 years upon the present inflated prices, and that any standard now decided would be upon the basis of the position before the war.

Witness, however, was strongly inclined to the belief that present prices would remain for several years, although he agreed that obviously inflated prices should not be taken as the basis. Coal would certainly remain high for some time; wages were most unlikely to go down; and the same remarks applied to residuals. On the question of the charge for public lighting, there was a loss of 1½ million feet in connection with the supply to the Council for this purpose. This supply had to be given through about 1000 services; yet the Council obtained their gas at the same price as the Great Western Railway Company, who took a much larger quantity through one service and used the gas for all purposes. He agreed with what had already been said—that the purchase clause hampered the operations of the Company.

In answer to a MEMBER OF THE COMMITTEE, who remarked that the Company did not appear to have suffered much in the past from the existence of the purchase clause, witness said it prevented the raising of capital on such favourable terms as would otherwise be the case.

Mr. *W. A. Schultz*, the chartered accountant who was called in by the Company and advised that the accounts should be put into statutory form, handed in tables showing the items which he regarded should have been charged to capital, and which made up the total already given of £21,709. As to residual products, the extraction of the toluol for the purposes of high explosives rendered the tar less saleable, and they had to accept any price the chemical manufacturers would give.

It was pointed out by a MEMBER OF THE COMMITTEE that, although the impression given by Mr. Davey was that the return from residuals was getting less, the actual total sum received showed an increase in 1915, although the return from tar was less than before.

Witness, continuing, said the amount of capital now asked for would carry the Company on for about 15 years, and he agreed that 4s. 3d. would be a fair standard price. As to the management of the Company, into which the Committee were asked to inquire, apart from the question of the finance, which had been fully explained, there was nothing in the management which could in any way be called mismanagement.

In cross-examination by Mr. CLODE, witness maintained that the Company should have been able to see at any moment the position with regard to the capital expenditure. It was obvious from the accounts that revenue was being applied to capital purposes. He had known other companies follow a similar course; and although it was not following the statutory requirements, yet it could not be said to be unsound, because the present consumers were getting the benefit in a cheaper production of gas than would otherwise be the case.

Mr. CLODE, speaking of the proposed new capital powers, said the Company had practically reconstructed the works out of revenue, and now wanted another £50,000 or so. He did not know what the money was to be used for.

Witness, asked as to the proposed standard price, would not agree that the present was a bad time to make the change-over to the sliding-scale, because, in his opinion, prices were not now more inflated than they would be for some years to come. He agreed with Mr. Davey as to the restrictive influence of a purchase clause.

Mr. *J. E. Kenshole*, the Engineer and General Manager of the Merthyr Tydfil Gas Company, gave evidence justifying the 4s. 3d. standard and the additional capital powers. He took a 4 per cent. increase in output, which was the average rate of increase over the last ten years. On this basis, the new capital would last thirteen years.

Mr. CLODES' cross-examination was directed to the point that in 1915, the Company could have paid the full 10 per cent. dividend and still have a small surplus. During this year, there were nine months at 3s. 6d. and three months at 3s. 9d., and consequently the 4s. 3d. was obviously too high.

Witness pointed out that in the accounts for 1916 would appear for the first time an increase in wages amounting to £1500, and a large increase in the coal cost.

Mr. *Frank Jones* said the plant was well up to the work now to be done, and were in a good state of repair. Up to the time of the lighting restrictions, the sale of gas had been substantially increasing. As to the standard price, it was a very difficult thing at present to settle this. The shareholders certainly should not suffer any loss by reason of the change; on the other hand, they should not benefit by it. Perhaps 4s. 3d. might be adopted for the period of the war and a certain time afterwards, and then drop to 3s. 9d. or 3s. 10d. The latter he regarded as the figure which should be allowed in normal times. He could not conceive that the Company could continue to sell gas at 3s. 9d. The price would have to be from 4s. to 4s. 3d., and when normal times returned about 4s. On the other hand, the present maximum price should be retained until after the war, and then an application made to the Board of Trade by Provisional Order to change over to the sliding-scale.

In cross-examination, witness said that, in his opinion, the amount allowed in the accounts of the Company for repairs did not suggest that a great deal of revenue had been used for capital purposes. The sum of 9d. per 1000 cubic feet was not too large an amount for repairs, even with small undertakings, as these latter frequently cost as much as, or more than, large undertakings. The Wandsworth and South Metropolitan Companies had spent this amount over a long period of years. If he saw a much larger sum, it would be suspicious.

Mr. CLODE: Nineteen pence, for instance?

Witness: Yes; but I have not discovered that this Company have spent 19d.

This concluded the case for the Bill.

Wednesday, May 10.

On the resumption of the proceedings to-day,

Mr. CLODE, addressing the Committee on behalf of the Aberdare Urban District Council, asked that the Bill should be rejected altogether. He contended that the principles of the measure were bad. For instance, the conversion of capital was not merely a conversion from a 10 per cent. to a 5 per cent. stock. If it were, it would be another matter; but his evidence would show it was a conversion not to a 5 per cent., but to a 6 per cent., stock. Again, the facts showed that the demand was not increasing, and therefore it was not necessary to raise new capital and build new works. To give the Company powers to raise 6 per cent. capital in these circumstances would be a most unfortunate thing for the district. Then it was asked that the purchase clause should be abolished. The whole of the past history of the Company showed that it would be inexpedient to give the powers now sought. Large sums had been taken from revenue and applied to capital when the money should have gone towards the reduction of the price to the consumer. The whole scheme of the Bill was a monstrous proposition. And what was the excuse for it? We were in the middle of a most dreadful crisis, everybody was trying to economize and to spend as little money as possible; and all the things which the Gas Company used were now at very high prices. If the Company went on in the future as they had done in the past, what guarantee had the Council that they would come to Parliament at the end of 12 or 15 years, as was suggested? The Local Authority had to rely upon the integrity of the Company, which they were not prepared to do. The proposal to fix a standard price in the present condition of things had no justification whatever; and unless the Company thought there would be an advantage to themselves, they would never have attempted it at all. Again, what additional capital was required to tide the Company over the period of the war? If the position was gone into on a fair basis, it would be seen the unexpended capital powers were £2500; and this alone would carry the undertaking on for some time. Then there were £1500 cash at the bank, and an investment which stood at £2000. Why at this time the Company should ask the Committee to fix this extraordinary standard price of 4s. 3d. he could not understand. Moreover, under clause 29 of the Bill, the Company could not raise any new capital during the period of the war without the consent of the Treasury. As to the equity of the 4s. 3d. standard price, the Company, when charging 3s. 6d., in 1910—when coal was not particularly cheap—were able to pay 10 per cent. and have a large balance over; in 1911, 10 per cent., with a balance of £1000; in 1912, the same dividend was paid, and the balance was £230; in 1913, 10 per cent., with a balance of £846; in 1914, the 10 per cent. was paid, and a balance of £1300 remained; while in 1915 the dividend was 8½ per cent. and the balance £686. On these figures it was clear that a standard price of 3s. 6d. was too high; and having regard to these facts, he asked the Committee not to fix any standard at the present

time. With regard to the necessity of new capital, witnesses for the Company could not point to any pressing work—all that had been referred to was the ordinary development of the Company. But the Company were not progressing, and were not in need of any urgent works. There was nothing which suggested that any large amount of capital was required at the present time. The Company could have gone on with the capital available, remain as a maximum-dividend concern, and then come in normal times to the Board of Trade with a Provisional Order, and have the price fixed fairly between the parties upon a normal basis. Coming to the question of public lighting, the whole point at issue was that large quantities of gas should be supplied cheaply; and this condition applied absolutely, for the Local Authority took 12½ per cent. of the total output of the Company. As to the suggested abolition of the purchase clause, he never heard a more barefaced attempt. The Company were asking for more capital, and by removing the purchase clause they were asking for it for ever. As a matter of fact, the rule was that when a company came to Parliament with such a record of mismanagement as this Company, if the local authority asked for a purchase clause Parliament gave one. So that if the Council had not had a purchase clause, it should have one to-day. The people in the district felt very strongly on this matter; and if the Committee repealed the purchase clause, it would be impossible for the Council ever to ask for one again.

Mr. *W. B. Keen*, chartered accountant, dealt with the financial history of the Company, and drew attention to the fact that it had been their practice to pay dividends free of income-tax, which resulted in some years, in effect, in a higher dividend than the Company were legally entitled to pay. He also contended that the amount charged as repairs and maintenance was as high as 19d. per 1000 cubic feet in some years. The whole effect of the war had been to arrest the progress of gas undertakings; and while the war continued there were no prospects of a general increase in the business of gas undertakings. So far as the statistics of the Company were concerned, there was nothing to encourage the hope of any substantial progress in the near future. In ordinary times there would be no objection to the conversion of the capital, provided a fair standard price was fixed; and, as a matter of fact, the Company could have paid 5 per cent. on the capital as converted, with a selling price of 3s., for several years except in 1915. This was on the assumption of 9d. for repairs and maintenance suggested by Mr. Jones; but 6d. was a common figure, and the 3s. charge would have left a substantial surplus after paying the maximum dividend. It was not a fair thing to fix any standard at present if the figures of the past were not to be accepted as a basis. He agreed that in the near future some additional capital powers would be necessary for the Company; and assuming that the Committee did not accept the view that no further capital powers should be granted at the present time, he had prepared an estimate of what he regarded as sufficient. During the last 15 years he calculated, from the accounts, that the total expenditure on capital account was £41,701, and a liberal amount on this basis for the future would be £40,000, although the evidence was that the undertaking was not progressing at the same rate as during the last 15 years. Having regard to the past history of the Company, the amount of new capital allowed should be limited as much as possible. He felt that £35,000 would be amply sufficient to carry the Company on for 15 years. As to the purchase clause, he had never known a case in which Parliament had repealed this in the manner now suggested.

In cross-examination by Mr. SHAW, it was agreed by witness that the Company in some years had not paid the maximum dividend, although there were funds available for the purpose which had been used for capital. It was not now suggested that the shareholders should be paid these back-dividends, although they were entitled to them. Regarding the suggested 19d. per 1000 for repairs, witness and Counsel differed as to the basis of arriving at this. It was contended for the Company that the amount actually charged was only 10 5d., which, however, replied Mr. Keen, was in any case very high. Counsel also put questions to show that it was in 1912 that the slight drop in output occurred when the Local Authority opened their electricity works, and also during that year there was a coal strike. In the next year, and up to 1915, the increase began to show itself again; but this was arrested in 1915, due to the war. Thus, the argument on behalf of the Council, said Counsel, that there were no signs of progress, was not sound. Counsel also questioned on the point that it would be unsound finance to make use of their investments for capital purposes, as had been suggested by Mr. Clode; but witness replied that though it would not be so in the case of an ordinary private business, the position was different in the case of a gas company. It all depended on the interests the company were looking after in keeping these investments. In this case, the consumers interests were being sacrificed, while the shareholders were getting the benefit of the investment. Any issue of capital now, witness agreed, would have to be over 5 per cent., in view of the existence of Exchequer Bonds. Finally, Counsel put it that had the Company dealt with capital in the ordinary way, the amount expended out of revenue would have involved charges amounting to £2500 per annum, equivalent to 6d. per 1000 cubic feet. Therefore, the consumers were reaping the benefit of the policy of the Company. Witness, however, said that the past consumers had paid this amount, in that higher prices had been charged in years gone by than would have otherwise been necessary. Counsel contended that this only accounted for part of the saving in capital charges which the Company had effected; the remainder having come out of the shareholders.

In reply to the CHAIRMAN, witness said the amount of capital asked for was a total of £53,000. He agreed it would be extremely unlikely that, even if the Bill was passed, the Company would be able to issue any capital for some time, as the Treasury were very strict in granting permission. His view was that the Company would go on with their own resources for the present. It was unfair to ask the Committee to fix a standard price, based on war conditions, upon which the Company were to work for all time.

Mr. *Isaac Carr*, the Engineer and Manager of the Widnes Corporation Gas and Water-Works, said that his undertaking supplied gas before the war at 1s. per 1000 cubic feet to ordinary consumers, 10d. to consumers using over 3,000,000 feet, and slot-meter users 1s. 4½d. Since the war, however, it had been necessary to make an all-round increase of 3d. In regard to the allowance for repairs and maintenance, 9d. was far too high. He believed that 3d. was sufficient in many cases. This was his own figure. The figures from "Field's Analysis" showed that the London companies spent 10·84d.; the Suburban companies, 10·7d.; Provincial companies, 6·8d.; Provincial corporations, 6·1d.; and Widnes, 3d. The traffic in London was responsible for the large expenditure; while the machinery which the London companies had for dealing with residuals added to the cost of maintenance. He agreed with Mr. Keen as to the standard price, capital required, and the proposed repeal of the purchase clause.

In cross-examination, witness said that the high percentage of leakage at Aberdare was partly the fault of the management, and was not due to the subsidences in the district to such an extent as had been suggested by the Company. He knew this from the fact that he advised the Aberdare Company some years ago on engineering matters. As to the prospects of the Company for the future, he believed that a 2 per cent. increase would be a high rate. Public lighting should be given at the lowest price, because it was a long-hour consumer. In Widnes, they supplied gas for public lighting free of charge.

This closed the case for the Urban District Council.

Mr. HONORATUS LLOYD then replied on behalf of the promoters. He remarked that while there was very little in regard to the Bill with which the promoters were in agreement with the opponents, there was one matter, and that was that the Company ought to have come to Parliament years ago. This fact he had laid before the Committee at the very commencement; and it was not a little interesting to find Mr. Clode first complaining that the Company should have come to Parliament long before now, and then stating that this was not the right time to come to Parliament with the scheme at all. Mr. Clode seemed rather to suggest that the Company, having gone on like this for years, should go on a bit longer in the same way. But the promoters could not take this view, and had been advised, once the position was really gone into, that they should go to Parliament at the earliest opportunity. As to the conversion of the capital, the objection was that it really constituted conversion from 10 per cent. to 12 per cent.; but, as he had already reminded the Committee, this all depended on arriving at a fair standard price. This went to the root of the whole matter; and the Committee having settled the standard price, the conversion became a perfectly simple matter. Another contradiction in the Council's case was that, having stated in their petition that there was no need for further capital, they then, through their witness, agreed that £35,000 would be a fair sum to allow the Company. Dealing with the position as to capital expenditure out of revenue, Counsel said that he had never attempted to justify the policy of the Company from the strictly legal point of view; but, looking at it financially, the results had not been very serious. A large part of the capital expenditure so used out of revenue had been provided by the shareholders, who might have had it in dividends; while the remainder had been obtained from the consumers, who had paid a higher price for their gas than they would have done otherwise. But, as had already been urged, had this additional capital been obtained in the ordinary way, it would have involved heavy capital charges; and this would have fallen on the consumer. Thus, looking at the matter from the purely commercial point of view, there had been no great offence, because the most economical and successful way to build-up a commercial business was, as far as possible, to build-up the works out of revenue and keep the capital low. In saying this, however, he had no desire to palliate the conduct of the Company in not coming to Parliament earlier. Reverting to the question of standard price, he urged on the Committee that one should be fixed which would encourage the Company to do their best in the general interests of the community which they were serving. The Company's books showed that the actual cost of gas was now 3s. 7½d.; whereas the Council asked for a standard price of 3s. It might be that the best way out of the difficulty, if there be one, would be to follow the clause adopted in the Folkestone Bill this year, which provided for a certain standard price during a certain short period, giving the Board of Trade power, on the application of the local authority within a certain time, to reduce it. As to the repeal of the purchase clause, looking at the matter broadly, it could hardly be said that the activity of the Aberdare Local Authority was very great. He was not much frightened of their exercising their power to purchase if it were left in the Bill; but for them to say that they did not know these works were growing, and that the Company had money, was ridiculous. The accounts showed perfectly well that the Company's capital, with the exception of £2500, was exhausted years ago. The district had an excellent supply of gas, and there had never been a complaint. Now the Company realized that they could not go on any longer in the way they had been going; and it was not until they came to Parliament with this scheme that the Council came forward with their charges of mismanagement.

THE COMMITTEE'S DECISION.

The CHAIRMAN said that the Committee, after deliberation, had decided that the Bill should proceed with certain modifications: (1) The standard price should be 3s. 9d.; (2) the purchase clause should remain in the Bill; (3) the additional capital should not exceed in all £40,000; (4) the Local Authority were to have the most favoured price as regards lighting and as regards power—treating the two things separately.

In answer to Mr. HONORATUS LLOYD, who wished this last point made quite explicit, the Chairman explained that the Committee desired that the Council should be charged at the lowest charge to ordinary consumers using gas for lighting, where the Local Authority used it for lighting, and the same as regards power.

The clauses of the Bill were then gone through; and it will be reported for third reading in due course.

A movement is on foot—with the capital already assured—with a view of establishing an important dye industry in the immediate locality of Swansea. Preliminary inquiries have been made, and negotiations are now taking place. It is said that Swansea and its environs are particularly suitable for such an industry.

IMPERIAL CONTINENTAL GAS ASSOCIATION BILL.

The Unopposed Bills Committee of the House of Commons sent this Bill forward for third reading last Thursday.

Mr. BROWNE (Messrs. Dyson and Co., Parliamentary Agents) said that the Imperial Continental Gas Association owned gas-works at different places on the Continent of Europe, which they worked themselves; while they had a controlling interest in a number of other gas and electric lighting undertakings. Unfortunately, the ten works which they managed themselves were either in enemy country or in country in the enemy possession. The main object of the Bill which had already passed the House of Lords [see "JOURNAL" for March 21, p. 700] was to supplement the existing powers in which the experience of working the undertaking had shown technically there were certain deficiencies. Clause 4 proposed to sanction and confirm certain sums paid out in November, 1914, and the early part of 1915, as dividends at a time when the full financial returns had not been received. It had since been found, however, that the funds were sufficient; but the amount having been paid out in the way it had, it was necessary to secure the approval of Parliament. Clause 5 authorized the issue of stock at less than par, if necessary, instead of at par as at present; and clause 7 sanctioned the issue of redeemable debenture stock. The existing debenture stock had been issued subject to the condition that it might be redeemed at any time by the Association at 105 on six months' notice. This was a condition it was asked should also be imposed by clause 7; and at the same time, the Bill took power to issue redeemable stock in the future when debenture stock was being issued. The clause followed the precedent of general and private Acts; and he drew the attention of the Committee to the fact that sub-clause 5 of clause 7 authorized the creation of a fund, out of revenue, for redeeming this debenture stock. The Company not being subject to the sliding-scale, the setting aside of money out of revenue in this way did not affect the consumer, inasmuch as the price of gas would not be affected.

Mr. WHITLEY (the Chairman): Might not you become one?

Mr. BROWNE said the Company could not supply gas in this country at all.

Finally, it was mentioned that the Colonial Office had taken exception to the use of the term in the Bill, "Colonies and dependencies;" and in order to avoid any injury to the susceptibilities of those living in the Colonies, the words "His Majesty's Overseas Dominions" had been adopted throughout the Bill.

Mr. MOON, K.C. (the Speaker's Counsel), suggested that the power under clause 4 would be required for future years as well as for last year.

Mr. BROWNE pointed out that this would not be necessary, as no further dividends were to be paid during the war.

The preamble was then proved, and the Bill ordered to be reported.

TYNEMOUTH CORPORATION BILL.

The Local Legislation Committee, under the chairmanship of Sir WILLIAM MIDDLEBROOK, considered Part II. of the above Bill (which deals with the Tynemouth Corporation water undertaking) on Tuesday, Wednesday, and Thursday of last week. The main purpose of this portion of the Bill is to carry out a parliamentary obligation to include Ashington within the Corporation water limits, and take over the mains, &c., of the Ashington Coal Company, which now supply the water in Ashington.

Counsel for the Corporation were: Mr. WEDDERBURN, K.C, Mr. LEWIS COWARD, K.C., and Mr. JEEVES. There were a large number of opponents, who were represented as follows: The Bedlingtonshire Urban District Council by Mr. HONORATUS LLOYD, K.C, and Mr. THOMAS; the Ashington Coal Company, by Mr. B. LAILEY, K.C., and Mr. ST. JOHN RAIKES; the Ashington Urban District Council, by Mr. LLOYD, K.C., and Mr. KEEN; the Morpeth Corporation by Mr. J. SCHOLEFIELD; the Newbiggin-on-Sea Urban District Council, by Mr. J. SCHOLEFIELD; Blyth Urban District Council, by Mr. G. J. TALBOT, K.C., and Mr. F. T. VILLIERS-BAILEY; the Cramlington Urban District Council, by Mr. TYLDESLEY JONES; the Seaton Delaval Urban District Council, by Mr. G. J. TALBOT, K.C., and Mr. F. T. VILLIERS-BAILEY.

Mr. WEDDERBURN, K.C., in opening, explained that at the present moment the Tynemouth Corporation supplied not only within the Corporation boundaries, but also in Whitley and Monkseaton, Cramlington, Bedlington, Newbiggin, Morpeth, Blyth, and Seaton Delaval. In the case of Morpeth, the agreement was for the supply of surplus water after the Corporation had met all other demands; but in the case of the others, there were special arrangements for a definite quantity at varying prices—some being at 4d. per 1000 gallons and others at 6d., without any revision of price, at any rate in the upward direction. The main object of Part II. of the Bill was, as provided in an Act of Parliament last year, to bring the district of Ashington within the actual water limits of the Corporation; the same rates being charged in Ashington as in Tynemouth, but Ashington not to be subject to any rate-in-aid in the event of a loss on the undertaking. At the present moment, the Corporation water supply came from the Font reservoir and gathering ground—most of the places already mentioned being on the line of the aqueduct from there to Tynemouth. When the Bill last year was under discussion, the Tosson Springs were referred to a good deal; this being the gathering ground selected by the Ashington Council, who proposed to provide themselves with their own supply from them. The Parliamentary Committee, however, decided that it would be cheaper to take a supply from the Tynemouth Corporation. Hence the Bill, which proposed to construct new works at Font to supply Ashington at a total cost of £165,540, in three instalments, to meet the natural growth of the demand all round—the first instalment of the expenditure being £27,860, *plus* £3000 for filters. The second instalment would be spent when Ashington's demand exceeds 400,000 gallons. The new works at Tosson were estimated finally to produce 450,000 gallons in addition to the present quantity of 2,900,000 gallons. At the same time, the rights which the Ashington Council had obtained with regard to the Tosson Springs had been taken over by the Corporation, and represented an additional source of supply for the future. While the Ashington Council and the Coal Company petitioned against the Bill with the object of assuring themselves that their district would, under the proposal, secure an adequate supply, they were not satisfied with the Bill as deposited. On the other hand, all the other authorities already supplied under the conditions mentioned argued that, by adding Ashington to the already large number of districts supplied, the Tynemouth Corporation were endangering their supply, seeing that Ashington was being added to the Tynemouth water area, and would be supplied first.

The CHAIRMAN, quite early in the proceedings, intimated the Committee's want of sympathy with all the parties to the dispute, which, he said, contained no real substance, and should have been adjusted outside.

Meanwhile, a clause had been given to Whitley and Monkseaton, and had been accepted by them, agreeing to construct the Tosson works within ten years, or as soon as the Font reservoir fell below 100 million gallons, whichever was the sooner, on condition that the Corporation could claim—which at present they cannot—a revision of prices within five years. The Corporation's case was that water now being sold in bulk at 4d. or 6d. per 1000 gallons was costing 7½d. This clause having been agreed with Whitley and Monkseaton, met the case for Ashington—the question of price not affecting that district, seeing that it came within the actual supply limits and would not be a bulk supply.

A difficulty then arose with the other authorities, who, while really getting the benefit of the Whitley clause, also desired a right to enforce it against the Corporation—a claim which was strongly resisted. Consequently, the Committee had to hear the case for the other local authorities on the point; the general case being that, unless the Corporation were put under an obligation to supply them with as much water as before Ashington came into the scheme, there would be some danger of shortage, with possible ill-health as a consequence.

It was late on Thursday afternoon that the Committee gave their decision, to the effect that the Corporation must come under an obligation to supply the other districts as hitherto, notwithstanding the extra supply entailed by Ashington.

The CHAIRMAN said this decision was irrespective of any terms in the agreement, with which the Committee had no power to interfere in any way. Morpeth would not come within this decision, as at present they could not demand any definite quantity of water, but only ask for such surplus as was available.

This decision is to be translated into a clause.

PLYMOUTH AND STONEHOUSE GAS BILL.

This Bill, which has already passed the House of Commons, was dealt with last Tuesday by the Unopposed Bills Committee of the House of Lords. The Bill will await report to the House pending the decision as to the clause relating to the issue of redeemable debentures mentioned during the proceedings before the Unopposed Bills Committee of the House of Commons. Reference was made to this point during the hearing of the Aberdare Bill reported on another page of this issue.

BANGOR GAS PROVISIONAL ORDER.

A Local Government (Ireland) Provisional Order (Gas) Bill has been introduced to confirm a Provisional Order relating to the Bangor Urban District Council gas undertaking. The Order authorizes the Council to acquire further lands; and the Bill contains a stipulation that the Council shall not, under the powers of the Order, purchase or acquire in any urban district any house which on Dec. 15 last was occupied wholly or partially by thirty or more persons belonging to the working class as tenants or lodgers or, except with the consent of the Local Government Board, any house which was not so occupied on that date but has been or shall be subsequently so occupied. Contravention of this provision will render them liable to a penalty of £500 in respect of every such house. "House" means any house or part of a house occupied as a separate dwelling, and the expression "working class" means mechanics, artizans, labourers, and others working for wages, hawkers, costermongers, persons not working for wages but working at some trade or handicraft without employing others except members of their own families, and persons other than domestic servants whose income does not exceed an average of 30s. a week, and the families of any such persons who may be residing with them.

South African Water Scheme.—In regard to a revised scheme for supplying the Witwatersrand with water from the Vaal River, the "South African Mining Journal" states that the whole of the preliminary arrangements in connection with the commencement of the scheme were made in July, 1914; but the outbreak of war made it quite impossible for the Rand Water Board to raise a loan on reasonable terms. It has now been found practicable, however, to borrow from the Board's redemption fund sufficient money to carry out a modified Vaal River scheme which would provide such a supply of water as would be likely to secure the Board's consumers against a shortage for some years to come. This modified scheme provides for the erection at Lindeque of a barrage composed of 36 gates, each 25 feet high and 30 feet wide. It will impound altogether 13,633 million gallons, of which the Board will be at liberty to abstract annually up to 7300 million gallons, or 20 million gallons a day. The estimated cost of the whole scheme is £758,000, of which £42,000 has already been spent on the collection of data, the erection of weirs, and other minor works and services classified under the head of preliminary expenses.

LEGAL INTELLIGENCE.

Use of Asbestos for Gas-Stoves.

The asbestos gas stove was a determining factor in a case affecting £10,000 worth of asbestos in the Prize Court last Tuesday. The Crown asked for the condemnation of this quantity of Canadian asbestos, seized as rights of Admiralty on two Holland-America liners. It was alleged that, though the asbestos was consigned to a Rotterdam firm, this Rotterdam firm (who had entered a claim to it) really hid the identity of the Rotterdam forwarding agent of the great Berlin asbestos firm of Becker and Haag, the biggest dealers in asbestos in Europe. Through the Attorney-General (Sir F. E. Smith, K.C.), the Crown contended that the asbestos was destined for the warlike purposes of the German Empire. The President (Sir Samuel Evans), however, cited his own asbestos gas-stove as proof that asbestos was used for other purposes than the packing of boilers on warships or jackets for furnace-men in munition factories. "We have all asbestos stoves," he said, "nowadays; and we know that there are other uses for asbestos than those that are military. Other people in this Court have their asbestos gas-stoves." Affidavits were put in to the effect that it was impossible to maintain any warships in an efficient state without an extensive use of asbestos. The Attorney-General explained that the claimant firm was promoted since the war broke out, with a paid-up capital of £800, by J. H. Koenigsfeld, Becker and Haag's forwarding agent (who also owned, in his own name, a fleet of steamers which plied on the Upper Rhine), and by a second shareholder of the same name. The Attorney-General contended that the claimants had set themselves, by various methods of concealment and chicanery, to impose on and deceive the Court. The President, giving judgment, said he could not shut his eyes to the other-than-warlike uses of asbestos for gas-stoves and so on; and these other uses prevented him from declaring that the object of the asbestos was necessarily warlike, so making it contraband. On the other question, however, of enemy destination and enemy ownership, he found that the ultimate destination was Germany, and that the asbestos was enemy property. The claimant Company formed by the two Koenigsfelds, with a small capital, was here only being used as the tool of Becker and Haag; and the conclusion he had come to was that the cargoes were the property of the Berlin firm, and were consequently enemy property. He ordered the proceeds of their sale to remain in Court until further order, or until the end of the war.

Thefts from the Southend Gas-Works.

Systematic abstraction from the stores of the Southend Gas Company was revealed last Wednesday at the adjourned Essex Quarter Sessions, at Chelmsford, before the Hon. E. B. Strutt and other Magistrates, when George Parmenter (38), described as an engine-driver, was indicted for feloniously entering the warehouse of the Company and stealing 115 brass cocks and some brass barrel unions, and James Collis (49), marine-store dealer, was indicted for receiving the goods. Both prisoners pleaded guilty. Parmenter, it was stated, had been in the employ of the Company for eighteen years, and was in charge of a stoking machine. By some improper means, he obtained a key of the warehouse, which he was suspected of having clandestinely visited several times. With a confederate outside in the person of a marine-store dealer, there was no difficulty in disposing of the stolen goods. Stores having been missed from time to time, a watch was set, and Parmenter was apprehended in the warehouse. Property valued in the Company's books at £57 10s. had been missed; and Counsel for the prosecution (Mr. Rowland Burrows) suggested that at the present price of the metal the value of the property stolen was much greater. Collis had been in business in the borough for nine years; and a police officer gave evidence that he had on several occasions assisted the police by giving information. Both prisoners were sentenced to four months' hard labour.

Aberfeldy Gas Company.—At Aberfeldy, the Gas Company have declared a dividend of 4 per cent. on the ordinary shares. Though coal is costing more, it is not proposed to make any alteration in the price of gas, which stands at 5s. 5d. per 1000 cubic feet. There has been an increase of 585,600 cubic feet in the consumption of gas during the past twelve months.

Price of Gas at Nelson.—The Chairman of the Gas Committee alluded, at a meeting of the Nelson Town Council last Wednesday night, to the decision to increase gas by 3d. per 1000 cubic feet, and coke 1d. per cwt., and said the advance was due to the serious increase in the price of coal and the income-tax. Nelson was one of the few towns in Lancashire which last year did not increase the price of gas; and, with the advance of 3d., it still compared favourably with other gas undertakings in the county. The estimated increase in the cost of coal was £7000; the income-tax was £2500; and the advance in the interest and sinking fund was £1000. They had not increased the prices of gas and coke in order to make profit, but simply to save the department from a very serious loss.

Tar Distilling at Plymouth.—Among the minutes of the Gas Committee presented at the meeting of the Plymouth Town Council yesterday week, were two relating to the disposal of the tar made at the Corporation Gas-Works at Devonport. It was reported that the General Purposes Committee had decided that no action be taken in opposition to the provisions of the Plymouth Gas Company's Bill for the purchase of tar-distilling works, and that a contract had been entered into with the Executors of Mr. T. H. Harvey (whose works the Plymouth Gas Company are to acquire), for the purchase of the surplus tar made at the Devonport works for twelve months, at the price of 15s. 6d. per ton, without any restriction as to supply. The Committee further resolved that the Consulting Engineer (Mr. Isaac Carr) be instructed to report as to the installation of a tar-distilling plant at the Devonport Gas-Works, with an estimate of the cost. The minutes were adopted by the Council.

MISCELLANEOUS NEWS.

DUBLIN GAS SUPPLY.

Effects of Insurrectionary Troubles.

[From Our Own Correspondent.]

The Alliance and Dublin Consumers' Gas Company are heavy sufferers by recent lamentable insurrectionary troubles in the Dublin city area. The Company announce that, at the beginning of the trouble, the rebels brought off vital portions of their manufacturing plant; that the gasholders in Barrow Street were severely injured by rifle fire; and that shells did serious damage to the holders in the city works. In the Sackville Street area, it was necessary to isolate the mains and service-pipes. The cutting-off of the supply had many advantages, in view of the fire terror and other destructive forces at work; but it led, of course, to very serious inconvenience to householders and to certain industries, especially the smaller ones. The loss entailed by this step will readily be understood; a calculation in detail will probably be supplied later. The Directors and officials and staffs of the Company did all that was possible in the grave circumstances which had arisen.

When, on Thursday, the 4th inst., it was decided to resume the supply the following Saturday, every praise was bestowed on the promptitude with which the management acted. On Friday, however, an entirely unforeseen occurrence rendered it impossible to carry out the arrangement; and a further announcement was made that the supply would be resumed as soon as possible. The occurrence referred to was of a startling character—the bursting of a main under the central platform footway of O'Connell Bridge. The explosion caused tremendous excitement—largely, no doubt, because of the "nervy" condition of things among the populace—and *débris* was flung high into the air. The military instantly occupied the bridge for traffic regulation; and measures were taken to remedy the burst, which was stated to be due to an accumulation of gas under the structure. The work was completed by last Tuesday; and the full supply of gas was turned on the following morning, to the great satisfaction of consumers in all parts of the metropolitan area.

SOUTH METROPOLITAN GAS BILL.

At to-day's meeting of the London County Council, the following report of the Parliamentary Committee, in regard to the action taken on the South Metropolitan Gas Company's Bill, will be presented.

The Council on Feb. 8, 1916, decided to seal and present petitions, if necessary, against the South Metropolitan Gas Bill. There were several points in the Bill upon which if appeared that representations to Parliament might be necessary, and a petition was accordingly deposited. One of the proposals which appeared to be objectionable from the point of view of the consumers was that enabling the Company to charge the revenue of the undertaking with an annual sum to form a sinking fund for the purpose of the redemption of redeemable stock, the issue of which was to be authorized by the Bill. A conference was held between our Chairman and Vice-Chairman and representatives of the Company, when it was agreed that the provision for the establishment of a sinking fund out of revenue should be deleted from the Bill.

It also appeared that the amount of additional capital proposed to be authorized by the Bill was considerably more than sufficient to provide for the permanent needs of the Company within a reasonable period of years. From the point of view of the public, it is recognized as undesirable that gas and other public companies should be able to abstain for an unreasonable period from applying to Parliament. The Company stated that their application was due in a large measure to the present abnormal circumstances—particularly the high price of coal—which necessitated a larger sum for working capital. This accounted for an additional capital of £500,000. It was pointed out to the Company that this would be rendered unnecessary upon the return to normal conditions, and it was suggested that in the circumstances the additional capital should be provided by means of temporary borrowing or by the issue of short-term mortgages, and to this the Company agreed. The Company also agreed to reduce the amount of permanent additional capital for which powers were being sought. The Bill was accordingly amended so as to enable the Company to raise, by the issue of ordinary or preference stock, additional capital to the extent of £250,000, instead of £1,000,000 as provided in the Bill as deposited; and so as to enable it to borrow £500,000 temporarily by mortgage or bond, to be repaid or redeemed within seven years, with the proviso that of this sum £100,000 might be raised by the issue of redeemable or unredeemable debenture stock which, together with the £250,000 above mentioned, could be a permanent addition to the capital of the Company. The Company will also have power to issue further stock for the purpose of redeeming any portion of the £100,000 which may be issued as redeemable stock.

Subject to any further drafting amendments in the clauses which might be considered necessary at a later stage, the Bill as amended appeared to us to be satisfactory; and in the circumstances we gave instructions for the Council's petition against the Bill to be withdrawn.

Brighouse Finances.—The estimates and rates for the ensuing year were approved at a special meeting of the Brighouse Town Council. It was explained that the total estimated expenditure which would have to be met was £20,058; and towards this sum there were expected to be contributions of £800 from the gas-works, £500 for the water department, and £300 from the electricity undertaking. The net profits on the trading accounts had been: Gas, 8 per cent.; water, 2·6 per cent.; and electricity, 3·93 per cent. The net loan debt of the Corporation now stood at £213,286, showing a reduction of £6556 for the year.

EXAMINATIONS IN "GAS SUPPLY."

The City and Guilds of London Question Paper.

The following were the questions put to candidates on Saturday, the 6th inst., at the examination in "Gas Supply." The Examiner was Mr. Walter Hole, of Leeds. The candidates were directed not to attempt to answer more than eight questions in the four hours allowed. The maximum number of marks obtainable is appended to each question.

GRADE I.

1. Why is a station governor needed? State precisely how it works. If it is automatic in its action, why does it need loading? [*38 marks.*]
2. Fig. 1 shows five types of stocks and dies. State the merits and demerits of each. [*32.*]

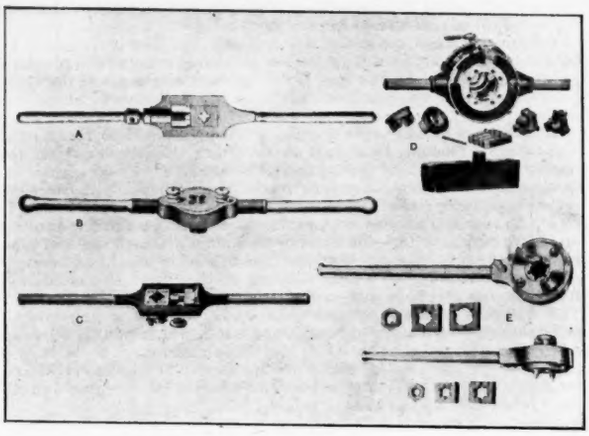


Fig. 1.

3. Given several pieces of wrought-iron piping of the same size, how would you judge which was the best? [*32.*]
4. Describe, with sketch, any arrangement you know for automatically ensuring correct registration in a wet meter as far as the water-line is concerned. [*42.*]
5. Fig. 2 shows a section through a dry gas-meter. Describe how it works and the utility of each lettered part. [*36.*]
6. What are the essentials of a good gas-cooker? State how these essentials are obtained in any cooker with which you are familiar. [*32.*]
7. How is it you may obtain a greater amount of light from an incandescent than from a flat-flame burner by the combustion of the same quantity of the same gas? [*42.*]
8. In fixing a gas-fire, what special points would you be careful about, so as to ensure the satisfactory working of the fire? [*38.*]
9. Assuming that the buried piping of a house was choked with naphthalene, how would you proceed to clear it? [*34.*]
10. Describe any system of switch control suitable for domestic lighting; stating precisely how it works. [*38.*]

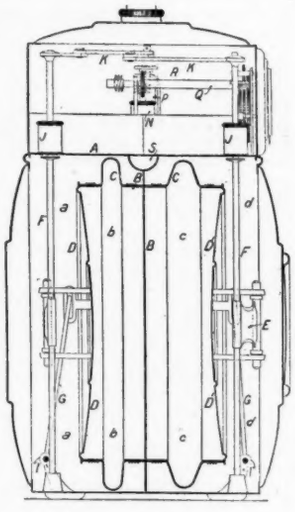


Fig. 2.

FINAL EXAMINATION.

1. It is found that a 20-inch trunk main, 2000 yards in length, will discharge 54,000 cubic feet of gas at a pressure of 3 inches head of water when the initial pressure is 3·4 inches. From start to finish there is a fall of 50 feet in the length of the main. How much additional gas will be transmitted when the initial pressure is raised to 4·5 inches head of water while the final pressure remains as before at 3 inches? ($Q = 1350 d^2 \sqrt{\frac{p\ d}{s\ l}}$ and the specific gravity of the gas is 0·4, air = 1.) [*34 marks.*]
2. Describe, with sketch, any gas-heated furnace with which you are familiar suitable for melting brass. State particularly how long you would expect the first melt to take from starting-up cold, and the gas consumption per pound of metal melted over three immediately successive melts of ½ cwt. of metal each; the mixture being one of 90 per cent. copper and 10 per cent. zinc. [*36.*]
3. Describe step by step how you would test a 10 light dry gas-meter in order to comply with the requirements of the Sales of Gas Act. [*34.*]
4. Work out the comparative costs per hour of heating a room 16 ft. square and 10 ft. high with (*a*) a gas-fire and (*b*) an electric radiator, assuming a 60 per cent. efficiency in the case of the fire and 90 per cent. in the case of the radiator. The air in the room is changed three times each hour, and the temperature must be raised 10° Fahr. above atmospheric temperature. The price of gas is 2s. 6d. per 1000 cubic feet, and electricity is 3d. per Board of Trade unit. [*38.*]
5. Discuss the advantages of town gas as compared with suction gas as a fuel for gas-engines of moderate power—say, 40 B.H.P. [*32.*]
6. Assume that you have to provide for an initial installation of parade lighting, consisting of twenty 1500-candle power high-pressure lamps. State (*a*) what apparatus you would require, (*b*) what type of apparatus you would use, (*c*) what consumption in cubic feet per hour you would allow for while providing for future extensions which would increase the total consumption to four times that of the initial installation. Draw a sketch of all necessary connections to your high-pressure plant. [*42.*]
7. State the case for high-pressure gas as compared with the half-watt electric lamp for street lighting. [*38.*]
8. Discuss the effect on the illumination of an apartment of different kinds of furniture and wall decorations. Assuming that wall papers of the following tints—viz., bright red, dull cardinal red, medium blue, light blue, dark green, and light green—were used in similar rooms, which would prove to be the most, and which the least, light absorbent? Arrange the other tints in order between the two. [*38.*]

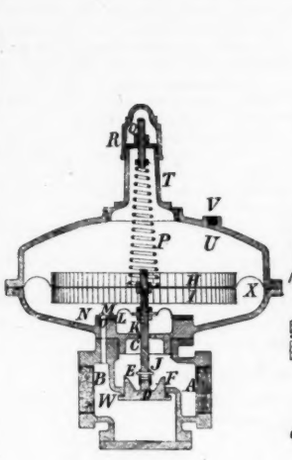


Fig. 3.

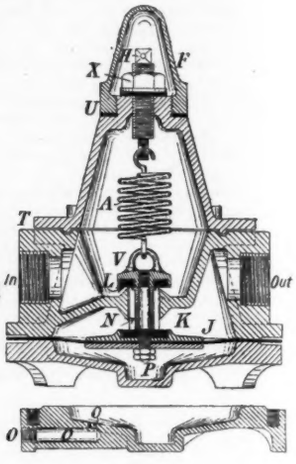


Fig. 4.

9. Figs. 3 and 4 are two types of high-pressure governors. Describe the utility of the lettered portions of each. State which type you think the better of the two, and why. [*32.*]

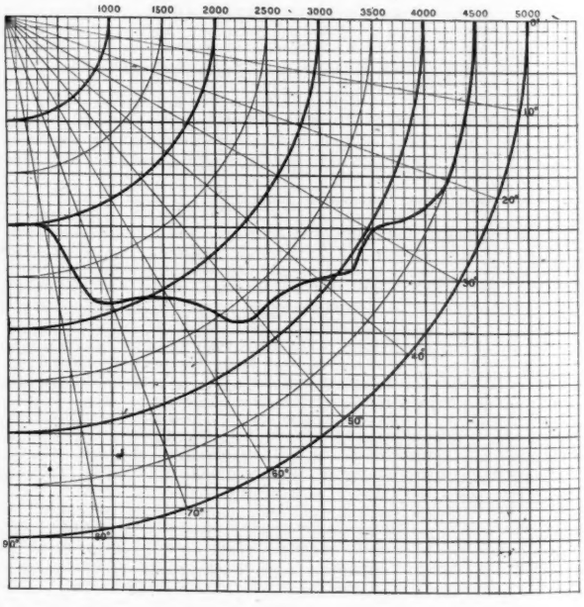


Fig. 5.

10. Fig. 5 is the half lower polar curve of a street-lamp. Calculate from the curve the illumination in foot-candles you would obtain at ground level—
   (*a*) Immediately beneath the lamp, assuming no obstruction,
   (*b*) At a distance of 20, 40, 60, and 80 feet respectively from a vertical line passing through the lamp,

when the light source is fixed at a height of 20 feet above the ground. It is assumed that the results at ground level are obtained on surfaces perpendicular to the beam. [*42.*]

NOTTINGHAM GAS WORKERS' ARBITRATION.

Sir George Askwith's Award.

Sir George Askwith has lost no time in making his award regarding the application of Nottingham Corporation gas workers for an all-round increase of remuneration, which had for several months formed the subject of negotiation between the Committee and representatives of the employees. The parties met the Chief Industrial Commissioner in London on Friday week; and the decision, affecting approximately 700 men, typifies a process, not unfamiliar in such matters, of adopting a middle course.

The applications emanating from the general body of Nottingham Corporation workmen, whose claims were based on the extra cost of living incidental to the war, had proved susceptible of ready adjustment, except in the case of the gas workers, whose demand brought into consideration the circumstance that not long ago an advance of 2d. per shift had been conceded. The position taken by the Committee was that the period was inopportune for a concession of the nature proposed, which would amount in the aggregate to a general increase to the several classes of workers affected equivalent to about 1d. per hour. The Arbitrator has split the difference—directing that men employed in the retort-houses, general gas workers, men in the distribution department, and meter-readers shall be given ½d. per hour advance on time rates, and an equivalent advance on piece rates, with a *pro rata* advance to boys and youths. The new scale is to take effect as from April 3; the Arbitrator noting that it was understood any advance was not to prejudice the extension of the war bonus of 2s. intended to be granted to men who, after the advance had been taken into account, would fall within the classes to whom the Corporation have granted such bonus in other departments.

ALLOCATION OF MACCLESFIELD GAS PROFITS.

A long discussion took place at the last meeting of the Macclesfield Town Council, when Alderman Isherwood (the Chairman of the Gas Committee) reported that the profit made during the year ended March 31 amounted to £6123, and that the Committee recommended that £3373 be carried to the maintenance fund, and the balance (£2750) to the relief of the rates. After pointing out that the profit was £1060 in excess of the previous year, Alderman Isherwood said that, out of the allotted sum for the maintenance fund, £2000 was earmarked for the new carburetted water-gas plant, and the remainder was to be devoted to urgent repairs. The profit for the year was remarkable, when they considered it had been made on a consumption of between 18 and 19 million cubic feet less than the previous year. Coal cost £4500 more; and the increase in the price of gas by 6d. per 1000 cubic feet did not cover this extra outlay. The profit for the year was due entirely to good management by their Engineer (Mr. J. E. Blundell) and the Assistant Engineer (Mr. Frank Belton).

Strong exception was taken by Mr. Sanders to the manner in which the profits were to be allocated. His contention was that, if the price of gas had not been increased, the gas profits would have been £2000 or £3000 less. The action of the Gas Committee in placing £2750 to the relief of rates was nothing but "legalized robbery." To his mind, the principle was wrong. There had never been a better opportunity presented than just now for the gas-works to be run for the gas consumer, and not for the ratepayer. The profits should be devoted to the upkeep of the works; and the whole of them should be used in connection with the undertaking. Provision should be made for a reduction in the price of gas. At present they were losing hundreds of customers, as a large number of people were going in for electricity [supplied by a private company]. He maintained that the people who were deserting the gas-works were disloyal. People who were loyal, having stuck to the gas-works, were being penalized, in order to benefit people who were deserters, simply because they happened to be ratepayers. They were extracting money from the pockets of the loyal men, and putting it into the pockets of the ratepayers who used electricity. It was not fair to the gas consumer or to the working-class population of the borough. He moved that the minute respecting the allocation of the profit be referred back for re-consideration.

The seconder (Mr. Pimblott) congratulated Mr. Blundell and Mr. Belton on the results of the year, and said he had always thought that the allocation of gas profits to the relief of rates was economically unsound. Many important men in the gas industry were in agreement with this. In their opinion, a certain portion should go to the consumers of gas. If the whole of the £2750 referred to was devoted to reducing the price of gas, they would still be able to decrease the rates by 6d. or 7d. in the pound.

Alderman Bailey (who seconded Alderman Isherwood's proposition) said the increased profits were due to the greater quantity of gas extracted per ton of coal. He urged the necessity of setting money aside for renewals; remarking that it was only by keeping the works up properly that they were enabled to make the profits.

Objection was offered by Alderman Isherwood to Mr. Sanders' term "legalized robbery." He reiterated that a great part of the profits made was due to good management. On the coal they were buying now they were paying £2500 more; and in face of this, it would be unbusinesslike to reduce the price of gas.

The amendment was defeated by 15 votes to 12.

The Directors of the Oriental Gas Company, Limited, have resolved to pay, on the 31st inst., an interim dividend at the usual rate of 3½ per cent. (less income-tax) on account of the year ending June 30 next.

Main Munitions.

THE most important munitions in your Summer campaign are Cookers. Every care is exercised in the manufacture of "Main" Cookers so as to ensure their giving the highest possible efficiency. Their range covers all contingencies. There is originality in the treatment of detail consistent with effectiveness and with an eye to economy in replacement. Make them your allies in advancing your summer sales.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

PROHIBITED EXPORTS.

There has been issued as a Proclamation (and it appeared in a "Supplement to the London Gazette" last Tuesday) a revised and complete list of articles the export of which has at different times been prohibited either to all or to certain destinations. The exportation of all the goods (among which are those mentioned below) is prohibited as follows: (1) Goods marked (A), to all destinations; (2) goods marked (B), to all ports and destinations abroad other than ports and destinations in British Possessions and Protectorates; (3) goods marked (C), to all destinations in foreign countries as well as in Europe and on the Mediterranean and Black Seas, other than France and French Possessions, Russia, Italy and Italian Possessions, Spain and Portugal, and to all ports in such foreign countries, and to all Russian Baltic ports.

(B) Ammonia and its salts, whether simple or compound (except ammonium nitrate, perchlorate, and sulphocyanide). (B) Ammonia, liquefied. (B) Ammonia liquor. (A) Ammonium nitrate, perchlorate, and sulphocyanide. (A) Anthracene oil. (C) Asphalt and liquid or solid bitumen. (A) Benzol and its compounds and preparations. (C) Burners, acetylene. (B) Calcium carbide. (A) Carbolic acid and compounds thereof, and preparations of all descriptions containing carbolic acid. (C) Carbon, gas. (A) Cerium, oxide and salts of. (C) Charcoal. (B) Coal, except coal allowed by the Commissioners of Customs and Excise to be shipped as bunker coal. (A) Coal tar. (A) Coal tar, all products (except creosote) obtainable from and derivatives thereof, suitable for use in the manufacture of dyes and explosives, whether obtained from coal tar or other sources, and mixtures containing such products or derivatives. (B) Coke, except petroleum coke. (C) Creosote. (A) Cresol, compounds and preparations of cresol (except saponified cresol) and nitrocresol. (B) Cresol (saponified). (A) Dyes and dyestuffs manufactured from coal tar products, and articles containing such dyes or dyestuffs. (B) Fuel, manufactured. (A) Green oil. (A) Incandescent mantles. (B) Manures, compound, containing nitrate or phosphate. (C) Monazite sand. (A) Naphthalene and its compounds and preparations. (A) Nitro-toluol. (C) Oils, creosote, except wood tar oil. (B) Petroleum, gas oil. (B) Ramie stockings and ramie fabrics suitable for the manufacture of gas-mantles. (A) Silica bricks. (A) Spent oxide. (A) Steel tubes. (A) Sulphur and preparations containing sulphur. (A) Sulphuric acid. (A) Thorium, oxide and salts of. (A) Toluol and its compounds and preparations.

Nottingham Public Lighting.—While it has been complained by some sections of Nottingham inhabitants that the restriction of public lighting in the city has been carried out of late to an undue extent, ratepayers will no doubt derive satisfaction from learning that, in conforming to the requirements of the military authorities, the saving has been such as to enable the responsible Committee, according to the budget presented to the Town Council, to estimate for an expenditure of £3753 less than last year, when the estimate was reduced by £2000.

BRADFORD MUNICIPAL UNDERTAKINGS.

A long statement was made by Alderman James Hill, M.P. (the Chairman of the Finance and General Purposes Committee), in introducing his annual "budget" at last Tuesday's meeting of the Bradford City Council.

In the first place, he said that, in comparison with the estimates for the past year, there had been an aggregate saving of £31,600, notwithstanding that payments of no less than £26,000 in respect of war bonuses and allowances to dependants of Corporation employees who had joined the colours had been charged to the rating funds. This credit balance of over £31,000 at the beginning of the new financial year was exceedingly satisfactory. Last year no less than £75,000 was taken in relief of rates from the trading undertakings and other reserves of the Corporation; and while in normal times he was in favour of a reasonable contribution being made from the trading undertakings—especially with a view of preventing rapid fluctuations in the rates—he thought that under the present abnormal conditions, and having regard to the good trade of the city and the ability of the citizens to pay, these balances should only be used for rate relief to the extent necessary to prevent an increase of the rates, and beyond that should be husbanded to avoid increases in the near future, and to meet certain expenditure which must be incurred, and the money for which—with the restrictions placed from Whitehall—could not be raised by means of borrowing. They were still negotiating with the Treasury and the Local Government Board for permission to borrow the money necessary to carry on, at a slow rate, the work of constructing the sewage tunnel to Esholt, and the new water pipe-line from the Nidd to Bradford; and in order to facilitate the negotiations, they had offered to provide the money for the Esholt tunnel without recourse to borrowing. The abnormally high price of money was bound to have a marked effect on the Corporation for some time to come. They had over £4,000,000 raised by means of short-term loans; and if, in the course of re-borrowing or renewal from time to time, it was necessary to pay an increase of 1 per cent., this would mean an added charge of £40,000 a year. Moreover, they must bear in mind that the "savings" which had been effected by the various Committees represented in many cases only a deferment of necessary expenditure, and that many new schemes which were very desirable, but which would cost money, had been hung-up until after the war. He did not say it was unwise to defer them; but they must have some prudent regard for the bill that somebody would have to pay. On the present occasion, he proposed to appropriate from trading profits £3400, as compared with £75,000 in the previous year; and the net decrease in the amount to be raised by rates was £665. However, by reason of the increased assessable value, rates of 1d less than last year would meet the Corporation's requirements. The Finance Committee's estimates showed a decrease of £27,985; and of this £22,500 was accounted for by the restricted

Industrial Canteens.

Illustration shows an installation erected for H.M. Office of Works for supplying complete meals to a large number of workpeople. Richmond's supply all necessary apparatus.

THE RICHMOND GAS STOVE & METER CO., Ltd.,

Academy Street, Warrington. 132, Queen Victoria Street, E.C.

lighting—£13,500 having been saved last year, and a further reduction of £9000 being estimated for this year.

Alderman Hill next dealt with the trading undertakings of the Corporation; but said that, in view of the fact that he was recommending only an appropriation of £3400, he did not propose to deal at length with the financial results. When members of the Council bore in mind the difficulties which had been encountered in the way of shortage of labour, increased price of commodities, and in many other directions, and had regard to the large payments by way of allowances to dependants and war bonuses, and the increasing rates of interest and income-tax, they could not but consider that the results were satisfactory, and reflected credit on the officials responsible for the management of the various undertakings. In regard to the loss on the Gas Department of approximately £8000, it was pleasing to note that this result was some £6000 better than that of the previous year, when the loss was £14,000. It would appear, however, that the increased charges, which had been in operation for nine months, would not be sufficient to enable the Committee to pay their way, having regard to the increased price of coal and other materials, and to the extraordinary expenditure at present occasioned by the war. At the commencement of the year there was a debit balance on revenue account of £4000; £10,000 had been charged to revenue account in respect of vertical retorts; and, with the loss on the year's working of £8000, there would be a total revenue deficit of £22,000. There was, however, a sum of £25,000 standing to the credit of the restoration fund, which it would be undesirable to disturb, but which might be treated as a set-off against the debit balance, leaving a net credit of £3000. In addition to the contribution of £10,000 to the cost of the new vertical retorts, £20,000 had been provided by revenue during the year, in liquidation of the debt, which now stood at £715,000, against a capital expenditure of £1,250,000. On the electricity works, he anticipated a net profit of something like the same figure as last year—namely, £19,000. Though the water-works had a larger output than last year, and would have made a profit, he was unable to give the result, as the application of the Spenborough Urban District Council for a reduction in the price of water supplied in bulk was still *sub judice*, and the profit might be considerably affected. The capital outlay during the year had been £67,000, making a total expenditure of £4,114,000, of which £895,000 had been repaid; the present debt being £3,219,000.

Few people, continued Alderman Hill, knew to › works were being used in the production of high explosives. The Gas Engineer (Mr. Charles Wood) had won commendation from the Munitions Department for the way in which he had done the work in Bradford and organized it for the Munitions Department in many other towns in the North of England. The necessity for indemnity of Corporation properties against air-raids had been fully considered; and it had been decided to insure the more important buildings and works, at an annual premium of £1700.

The motion for the adoption of the estimates was carried.

TRIBUNALS AND EXEMPTION APPLICATIONS.

Among cases which have been recently decided, it may be mentioned that the Southport Tribunal exempted Philip H. Christian, Outdoor Superintendent of the Corporation Gas Department, from military duty. At the same sitting, John Rimmer, farmer and contractor, who said he was a contractor for the gas-works for hauling and emptying coal-waggons, asked for the total exemption of three of his men, all married. The appeal was not allowed.

At a sitting of the Eastbourne Borough Tribunal, Mr. J. S. Garrard, Secretary to the Gas Company, applied for exemption for Mr. Holloway, a clerk in the Company's office. Applicant, 28 years of age and single, admitted having had already two months' exemption. The Military Representative said that, in view of the age and single position, he could not assent to the application. Mr. Garrard remarked that shortly the Tribunal would be asked to consider the claims of the whole of the Company's employees of military age. The Court thereupon decided to adjourn the application until the other cases come before them.

There was considerable discussion at a meeting of the Midlothian Recruiting Tribunal, sitting in Edinburgh, over the case of a lad of 19 engaged in his spare time by the Edinburgh and District Water Trust. An application was made by the Military Representative to have the lad's existing exemption certificate withdrawn. On behalf of the Water Trust, it was stated that the lad, who resided with his father at one of the reservoirs, gave his spare time to the Trust, and was called out only in emergencies at night. He knew the sites of all the valves, and would be urgently required if any of the mains were bombed. It was explained that he would have been engaged on full time recently; but the Trust did not wish to be misunderstood, and had left matters as they were. The Agent for the Water Trust said that, of all the public departments, the Trust was the very last that should be depleted of men. The Tribunal, by a majority, sustained the application of the Military Representative to have the exemption certificate taken away, but advised that the lad should not be called up before July 1, to enable another man to be trained to the work. Sir John Don Wauchope repudiated any responsibility for taking away the lad even in July, as serious consequences might arise.

In connection with an appeal to the local Tribunal on behalf of Samuel Newton (aged 26), a pipe-fitter employed by the Ashton-under-Lyne Gas Company, Mr. Joseph Townsley (the Manager) said that out of 112 men in their employ at the present time 65 were over military age, eleven medically rejected, and they had two girls and three boys. They did not intend to appeal for any man, whatever his position, who had not voluntarily attested. The badges he had received had been given out to men over military age; but he could have badged this man. He had men over 70 badged. Exemption was granted until July 31. The Tribunal advised the Company to have Newton badged in the meantime.

Mr. E. L. Adlington, the Manager of the Worcester Gas Company,

"A Booklet that will well repay distribution."

(*One who has seen it.*)

The Davis 1916 Summer Booklet (now ready) is an appeal to the Consumer from the economical standpoint, and its judicious local distribution, at a time like the present, cannot fail to benefit Gas Undertakings concerned.

Revised Prices, with prevailing general advances included.

THE DAVIS GAS STOVE Co. Ltd

The Gas Exhibition Salons,
60, Oxford St., London, W.

applied on behalf of his son (aged 28), who was acting as Assistant Manager. Mr. Adlington said he had three assistants when the war broke out; and his son was the only one left. He would be unable to fill his place. The Military Representative remarked that he knew what the Company had done in regard to recruiting, and he raised no objection. Exemption was granted until Oct. 31.

The Manager of the Wirral Water Company applied at Birkenhead for the absolute exemption of a clerk who had been twenty years in the Company's employ. It was explained that appellant was a highly-trained clerk, and if he were taken away the public would suffer, as the efficient administration of the undertaking would be impaired. He had the oversight of an area measuring 100 square miles, in which there were camps and hospitals, all of which came under his supervision. Exemption to Sept. 1 was granted.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 15.

There is little of interest to report in the London tar products market. Pitch for export is still quoted at 19s. to 19s. 6d. net per ton at makers' works, while the home trade pays a much higher figure. Creosote remains nominally at 4d. to 4½d. net per gallon in bulk *ex* works, although definite transactions have just been carried through for important quantities at more money. Solvent naphtha is in good demand at about 2s. 2d. net per gallon into buyers' packages.

Sulphate of ammonia is quiet for prompt delivery, and values are uncertain. No recent sale, however, of 25 per cent. quality has been reported, and makers are understood to be disinclined to quote at present.

Tar Products in the Provinces.

May 15.

There is little or no alteration in the markets for tar products. No business of importance is reported in pitch. Very reasonable prices are still being accepted for creosote. Solvent naphtha is steady. Heavy naphtha is in fair demand.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 6d. to 19s. 6d. Pitch, East Coast, 15s. to 15s. 6d. per ton; West Coast, 14s. to 14s. 6d. Manchester; 15s. to 15s. 6d. Liverpool; 17s. to 17s. 6d. Clyde. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¾d. to 7¼d. Solvent naphtha, naked, North, 2s. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2¼d. to 2½d. Heavy oils, in bulk, 3¼d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene, salts, 80s., bags included. Anthracene, "A" quality, 2d. to 2¼d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *May* 13.

During the past week demand for this material has continued good, and, as those makers who were most anxious to sell have now disposed of the quantities they had for immediate delivery, the tone of the market has become firmer for near delivery. At the close, prices have advanced to £16 15s. per ton f.o.b. Hull, £16 17s. 6d. f.o.b. Liverpool, and £17 f o.b. Leith. In the forward position, however, no change has taken place, and it has transpired that first-hand business has been done for delivery during the second half of the year at £17 to £17 2s. 6d. per ton at the ports.

Nitrate of Soda.

The market for this article has remained firm, and quotations are unaltered at 18s. 9d. per cwt. for ordinary quality, and 19s. 6d. for refined.

Sulphate of Ammonia.

From another source it is stated that to-day's quotations for this article are as follows: Outside London makes, £15 15s. to £15 17s. 6d.; Hull, £16 12s. 6d.; Liverpool, £16 15s.; Leith, £16 17s. 6d.; and Middlesbrough, £16 15s.

Increase in Price at Dunoon.—At the monthly meeting of the Dunoon Town Council, the Gas Committee submitted a recommendation that the price of gas be increased by 5d. per 1000 cubic feet as from the 15th inst. The consumption, it was stated, had been reduced by 5 million cubic feet, owing to the lighting restrictions in force. While the Gas Department lost this, the ratepayers would save in another direction to the extent of £250, which meant 1d. off the rates. The increase was approved. The price of gas will now be: Dunoon, 5s. per 1000 cubic feet; Innellan, 5s. 10d.; Sandbank, 6s. 3d.

The American Benzol and Toluol Market.—The "Iron and Coal Trades Review" reports that an increasing output of benzol, toluol, and allied products is being made by American iron and steel companies; and it is estimated that the yearly production of benzol is now not far from 25,000,000 gallons. Most of this has been contracted for and sold to explosive makers principally. The market for benzol on contract is firm at about 3s. per gallon, producer's plant, with spot benzol commanding 3s. 4d. to 3s. 9d. Toluol is quoted at 18s. 9d. per gallon, producer's plant, on contract, and at 19s. 9d. to £1 for spot. There is practically no contract market, and supplies are very small. Solvent naphtha is selling at 1s. 8d. to 1s. 10½d. per gallon on contract, and 1s. 10½d. to 2s. 1d. per gallon for spot, at producer's plant, with the supply and demand about balanced.

"BEARSCOT" SPECIALITIES

Telegrams: "Scrubber, Manchester."

"Have never failed to give Satisfaction."

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London Office: 165, GRESHAM HOUSE, Old Broad St., E.C.

"... AND SANITARY IMPROVEMENT."—May 23, 1916.—Registered as a Newspaper.

COAL TRADE REPORT.

Northern Coal Trade.

The coal market is stronger; and though the advance in the price is most shown in Northumbrian coals, it is also felt in various kinds of Durham coals, though there is still some scarcity of ready steamers at the coal ports. In the steam coal trade, the record prices that are quoted do not seem to check the keen demand. Best Northumbrian steams are up to 55s. per ton f.o.b.; and second-class steams are about 44s. per ton. Steam smalls are very firm, and are quoted from 32s. 6d. to 35s.; but there is some variation, according to the time of delivery possible, and it is known that some of the collieries have very little coal free for early delivery. The output is now fairly steady; but the shortage of miners is felt now that the shipping season has begun. In the gas coal trade, the demand is full, though the home consumption is now near its summer level, and the prices for sales are firm—the last increase in the wages of the miners having now taken effect. Best Durham gas coals are from 35s. to 36s. per ton f.o.b.; for second-class gas coals near 32s. 6d. per ton is quoted; and for "Wear Specials," 37s. 6d. per ton. It needs to be repeated, however, that much coal is being delivered on contract at considerably lower values. New contracts are only being slowly entered into, for reasons previously named. The rate of freight on coal is firm. Gas coal, Tyne to London, is about 16s. freight where contracts do not rule, and £5 per ton is the heavy rate that has to be paid for Tyne to Genoa. Coke is rather firmer, with a good demand in the export branch. Good gas coke is steady at 25s. 6d. to 27s. 6d. per ton f.o.b.

Nottingham Municipal Profits.

With the possibility thereby afforded of reducing the district rate by 5d. in the pound, the Nottingham Corporation, at their meeting on Monday of last week, readily acquiesced in the proposal to draw upon the profits of the gas, tramway, and electricity undertakings to the extent of £60,350, of which £35,000 represented the welcome contribution of the largest of the municipal trading concerns. The satisfaction, as expressed by Alderman E. Mellor, in introducing the budget, was unmistakable, that, in a period attended by so many difficulties, the Gas Committee should be able to find a sum which fell short by only £4000 of the high figures reached in the preceding year. The occasion was not allowed to pass without a reminder as to the necessity of replenishing some reserves which had been laid under contribution. The matter, however, it is interesting to note, had no reference to the gas undertaking—the consideration being purely applicable to the accounts of the tramway and electricity concerns, in regard to which means have been adopted to promptly compensate for the temporary depletion of funds. Therein the sound policy of the Gas Committee, consistently pursued during the present *régime*, has been exemplified. While the contributions from the undertaking in aid of rates have of late years been upon a most liberal scale, the cost of necessary renewals and improvements has been defrayed without trenching upon reserves.

Economizing in the Use of Coal.

A memorandum has been issued by the District Coal and Coke Supplies Committee for South Wales and Monmouthshire, appointed by the Board of Trade to arrange for the supplies of coal and coke for home consumption, in which attention is directed to the following facts: (1) The output has been considerably reduced, owing to the large number of miners who have joined the army; (2) there is a serious shortage in the supply of coal for home consumption, owing to the large requirements of munition and other works producing war materials, and in consequence of the demands made by the Admiralty and the Governments of the Allies; (3) the amount required for ordinary home consumption should be reduced as much as possible, in order to keep munition works, the Admiralty, and Governments of the Allies fully supplied; (4) coal is one of the most important commodities that can be offered in exchange for goods imported from other countries. The Committee, therefore, ask that every assistance possible shall be rendered by all users of fuel to keep their requirements down to the lowest possible limits. Further, consumers can co-operate with the Committee by endeavouring to use such coal as is offered to meet their demands, without insisting on obtaining exactly the same description as they have previously received.

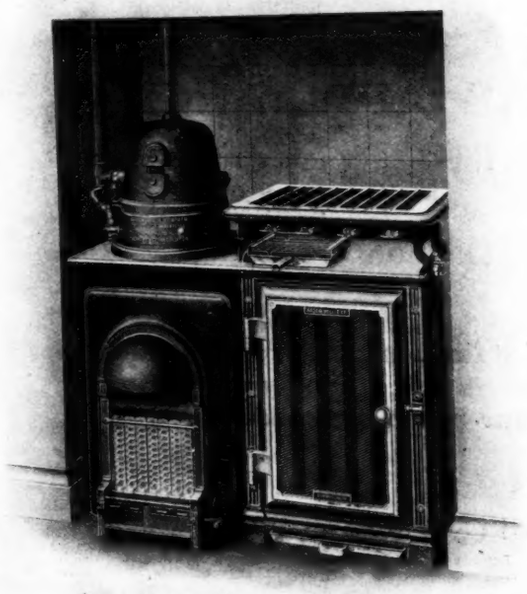
Hints on Economy.

Of hints on economy there has been a bountiful supply—sometimes in leaflets or in letters to the Press, and at others on street hoardings, &c. But there will be a warm welcome notwithstanding for a lesson in economy on so important a subject as heating and cooking, which introduces some excellent reasons for using gas—particularly when the information is presented in an attractively designed pamphlet of a size to slip easily into the waistcoat pocket. Such a pamphlet has been prepared by Messrs. Fletcher, Russell, and Co., of Warrington; the object being to point out that the way to economy in the home is in the use of gas in conjunction with cookers, water-heaters, and fires. The advantages of heating by gas are first set out in what will be agreed is a convincing manner; the reader, among other things, is shown at how slight a cost it is possible to enjoy the acme of comfort—a bedroom fire during the winter months. To go cold to bed nowadays really means the self-infliction of an unnecessary hardship; and it is truly remarked that "the idea that a warmed bedroom is an extravagance, is one of the slowly dying traditions of the war-fruit age." The economy of cooking by gas has its own section in the booklet; and then other forms of gas-economy are dealt with—all in a manner which is brief and to the point, while the letterpress is interspersed with appropriate little illustrations. It is a booklet which will be read.

A scheme has been adopted whereby the employees at the Middlesbrough Corporation Gas-Works can be available, and in readiness for duty, in case of damage to property through bombardment.

ARDEN HILL'S
Combination All-Gas Range

COMPACT. :: CONVENIENT. :: ECONOMICAL.



Comprising—

THE "PATRIOT" GAS COOKER.

LATEST PATTERN GAS FIRE
with "Injector-Ventilator."

"ACMEFONT" GAS-HEATED CIRCULATOR
with Thermostat—to serve 20-gallon Tank or Cylinder.

OVERALL DIMENSIONS—
3 ft. 6 in. wide; 1 ft. 9 in. deep; 4 ft. 9 in. high.

Expressly designed to dispense entirely with the coal grate, whether for cooking, heating, or hot water supply.

ILLUSTRATED PARTICULARS ON APPLICATION.

ARDEN HILL & CO.,
Acme Works, BIRMINGHAM.

Yeovil Gas-Works Results.—The Gas Committee's report to the Yeovil Town Council, which is signed by the Chairman of the Committee (Mr. G. Gould), states that the make of gas for the year ended March 31 was almost exactly 90 million cubic feet—a small increase on the previous year. The profit made amounted to £5269; and after payment of interest on capital, repayment of principal, income-tax, &c., there was a balance of £304 to be carried to next year's account. The Committee recommended that for the present no further increase in the price of gas be made. The statistics prepared by the Manager (Mr. E. Howell) show that the make of gas per ton of coal carbonized was 11,560 cubic feet, and the quantity sold was 10,710 feet. During the year, 68 additional meters and 78 cookers were put into use in the district.

Increased Bonus to Employees at Ossett.—When the members of the Ossett Town Council had before them a recommendation by the Gas Committee that the bonus to gas-works employees should be increased from 2s. to 3s. per week, Mr. Stead moved an amendment to the effect that the minimum wages for gas workers should be 30s. a week. Mr. Marsh, who seconded the amendment, pointed out that for teamers the local rate of wages was 30s. 9d. per week, inclusive of war bonus. Mr. Peace contended that no real advance was proposed, as, taking into consideration the decreased purchasing power of a sovereign, a wage of 24s. a week four years ago was only equivalent to 16s. 9d. now. He warned the Council against the labour troubles which might occur if the burden on the very poor was made too great. Alderman Robinson (the Chairman of the Gas Committee) stated that, with the exception of a few employees who were to be paid 29s. 10d. per week, inclusive of the increased bonus, the only men working for the Gas Department in receipt of less than 30s. would be three teamers at 29s. Mr. Stead said it was the teamers for whom he was appealing. The amendment was carried.

Cape Town and District Gas Company.—At the meeting of the Company to-morrow, the Directors will submit the accounts for the year ended Dec. 31 last, showing, with the amount brought forward, a total of £24,630 to the credit of the profit and loss account. After meeting debenture charges, writing off a sum for depreciation of stocks, and making transfers to reserve and renewals accounts, there is a balance of £6336, out of which the Directors propose to pay a year's dividend on the preference shares, absorbing £4500, and leaving to carry forward £1836. A larger sum could have been distributed as dividend, but for the necessity of reducing loans and debentures. During the year, £5000 of 6 per cent. first mortgage debentures were redeemed; and loans due by the Company have been reduced by £3000. There was an increase during the year of 167 in the number of consumers. In the first six months a considerable decrease occurred in the sales of gas, through the disturbed condition of affairs in South Africa; but there was a favourable change in the latter half of the year, when the increased sales more than balanced the decrease in the first half. Progress from the end of 1915 down to the present time has continued to be satisfactory.

Gosport Public Lighting Charges.—A report which was adopted at the last meeting of the Gosport and Alverstoke Urban District Council stated that, in reply to the Council's inquiry as to what allowance they were prepared to make in view of the fact that the lamps were now extinguished at midnight, the Roads and Works Committee had received a letter from the Gas Company stating that, owing to the serious loss they have sustained by reason of the restricted lighting order, and the generous manner in which they recently met the Council with reference to the charge for unlighted lamps, they regretted they were unable to make any further allowance.

Southampton Gas Company's Employees and the War.—Allusion was made in the report last week of the meeting of the Southampton Gas Company [p. 290] to what has been done by the employees in connection with the war. It was mentioned then that all employees of military age had, with very few exceptions, been attested; and that the Company were doing their utmost to assist the Government by releasing as many men as possible—no exemption having been applied for except for such men as were absolutely indispensable. The result of this is that at the present time the proportion of the Company's employees serving in His Majesty's forces is over 25 per cent.—not 12 per cent., as was stated last week.

Street Lighting at Teignmouth.—Considerable discussion took place at the last meeting of the Teignmouth District Council, with reference to a recommendation of the Highways Committee that the street-lamps be not lighted from May to August inclusive. Mr. French opposed the proposal, as one of false economy and a cause of danger to the public, and pointed out that if money was saved by not lighting the street-lamps the gas consumers would have to make up the revenue of the undertaking in an increased price. Other members, however, contended that there would be a saving both of coal and labour; and though it was admitted that there would be public inconvenience, it was thought that visitors would not expect to find things as they were in peace time. The Committee's recommendation was adopted, by six votes to four.

Monte Video Gas Company.—The report for the year ended Dec. 31, to be submitted at the meeting to-morrow, states that the profit on working, as shown by the revenue account, is £27,625. After providing for debenture interest and other charges, and including £13,255 brought forward, the balance at the credit of profit and loss available for dividend is £29,519. An interim dividend of 6s. per share (less income-tax) was paid in respect of the six months ended June 30; and the Board now recommend the payment of a similar amount (also less income-tax), making together a dividend of 3 per cent. for the year, and carrying forward £13,261. Owing to the large number of unoccupied houses, through the financial depression, there has been a falling-off in the number of consumers; but notwithstanding this, gas sales for the year show an increase of 3·09 per cent. The revenue account shows an increase in receipts of £19,225; while the expenditure has been more by £15,561. The balance of profit therefore shows an improvement of £3664.

By Appointment Ironfounders to H.M. the King.

The Manufacturing resources at CARRON are unique and unparalleled and so extensive as to cater for every requirement in

GAS APPLIANCES

from the simple grill to the largest and most complete Cooking installation.

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Branch Works: Phœnix Foundry, Sheffield.

Show-Rooms: London (City and West End), Liverpool, Manchester, Bristol, Birmingham, Newcastle-on-Tyne, Edinburgh, Glasgow, and Dublin.

Heating Efficiency Tests at Manchester.—At the last meeting of the Sanitary Committee of the Manchester Corporation, it was reported, in connection with the proceedings of the Air-Pollution Advisory Board (Sub-Committees of which have for several months been investigating the amount of damage done in the city and suburbs by smoke, and the monetary loss to the community therefrom), that heating efficiency tests of gas-fires, electric radiators, and open coal-fires were still being carried out by Professor Gee's staff (under the auspices of the Chemical Sub-Committee) at the Manchester School of Technology, and are expected to show remarkable results.

The Past Year at Dukinfield.—In his report and statement of accounts for the past twelve months, Mr. William Lindley, the Manager of the Dukinfield Corporation Gas-Works, states that the carbonizing plant worked satisfactorily; the yield of gas per ton having been 12,787 cubic feet. The sales, at 93,500,000 cubic feet, were 500,000 cubic feet more than in the preceding year. The cost of coal and cannel was £7259, or 17s. 10½d. per ton; and the total make of gas was 103,887,000 cubic feet—the proportion unaccounted-for being 9·83 per cent., making the quantity sold per ton 11,529 feet. The accounts show a gross profit of £4364, and a net profit of £1108, as compared with a loss of £1965 for the previous year.

An illustrated article in the current issue of "Engineering" deals with the gas-heated melting and annealing furnaces of Messrs. John Wright and Co.; the apparatus described including that to which special reference was made in the paragraph on the "Gas-Furnace Book" which appeared on p. 263 of the last number of the "JOURNAL."

The new Davis cooker list (with an attractive coloured picture on the wrapper, entitled "After the Theatre") furnishes illustrated particulars of the well-known kitchen appliances of the Davis Gas-Stove Company, Limited. There is also a page on "National Economy," introduced as an argument for the Davis cookers. Water-heaters, radiators, and gas-fires also find a place in the booklet.

A year ago, Mr. R. W. Edwards, the General Manager of the Aldershot Gas, Water, and District Lighting Company, instituted a May Day horse parade, so as to encourage the employees of the Company in the careful looking after of the animals placed in their charge. The second competition took place on the 1st inst., when the money prizes were distributed by Miss "Patsie" Edwards, daughter of the General Manager; the winners being at the same time warmly congratulated by Mr. Edwards upon the care and attention which they had devoted to their charges during the year. Similar inducements are held out to the drivers of motors, &c., owned by the Company.

STOCK MARKET REPORT.

THE Stock Exchange opened last week in not the most cheerful frame of mind, having little confidence in the courage of the Government to deal with judicial and judicious firmness with the Irish situation. Business was quiet and shy for a while. By degrees, however, favourable factors brought their influence to bear, the tone improved, activity quickened, and the week closed with many markets strong and with general cheerfulness. Government issues were fair on the whole, though the War Loan was irregular at times. Uncertainty as to the Government's line in the future financing of the war did not tend to promote firmness. Home Rails were very good; prices rising steadily in response to a strong demand. This was largely due to the emancipation of their prior charges from the thrall of minimum prices—a long-delayed step towards the restoration of normal market conditions. The Foreign Market maintained the strong points of the week before; the French loan exhibiting marked firmness, and Peruvian and Brazilian issues being in demand. Americans were more healthy; political affairs being regarded more calmly. Canadian Pacific made a large advance; but Trunks were flat. Argentines were firmer; and South Africans were fair to steady. In the Miscellaneous Market, rubber and oil made considerable improvement, and shipping issues made further advances upon their gains of the week before. Business in the Gas Market was only moderate in point of volume. Prices for the most part showed hardly any change, and may be quoted as firm; but Imperial Continental made a sharp rise just before the close. Oriental will pay the usual interim dividend on the 31st inst., and Monte Video a dividend (the same as last year) on the 1st prox. Hong Kong and China will pass the 1915 dividend, and apply the revenue balance to the reduction of loans. Prominent among topics of interest in gas circles were the 10 per cent. reduction circular of the Board of Trade and the Daylight Saving Bill. As to the former, there is reason to hope it will be either withdrawn or else allowed to die in peace. In the Money Market, there was a rather better demand for money late in the week, and discount rates showed a disposition to harden.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 73⅛, 73¼, 74, ditto preference 74½, 74⅜, 75, Primitiva preference 3¼, South Metropolitan 77½. On Tuesday, Commercial debenture 55½, 55½, Gas Light ordinary 73, 73⅛, 73½, 74, 74½, ditto preference 74, Imperial Continental 59½, 60, 60¼, 60⅜. On Wednesday, British 35, Gas Light ordinary 73, 73⅛, 73¼, ditto maximum 59⅛, 60, Imperial Continental 60, 60⅛, 60¼, 60⅞, Melbourne 96½, Primitiva preference 3 7/16, ditto debenture 81, South Metropolitan 77⅛, South Suburban, West Kent, 82. On Thursday, Gas Light ordinary 73, 73⅛, ditto maximum 60, ditto preference 74, Imperial Continental 60⅛, 60¼, Monte Video 9, Primitiva preference 3⅜, On Friday, Gas Light ordinary 73, 73⅛, 73½, 73⅝, ditto maximum 59⅛, Imperial Continental 60¼, 62, 62¼, 62½, Monte Video 9, South Metropolitan 77, 77½. On Saturday, Continental Union 37, Gas Light ordinary 73⅛, Primitiva 2, South Metropolitan 77, 77½, ditto debenture 59, 60.

The Bank rate is 5 per cent.—as fixed on Aug. 8, 1914.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.				£ s. d.	
1,551,868	Stk.	April 8	2½	5½	Alliance & Dublin Ord.	59—64	8 18 2	..
874,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	5 1 8	..
980,000	5	April 29	7½	8/-	Bombay, Ltd.	5½—6½	5 17 8	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	29—30	5 6 8	..
333,110	10	,,	7	7/-		15—15½	4 10 4	..
115,000	10	,,	6	6/-		13½—14	4 5 9	..
159,740	—	—	—	4		..	—	..
992,045	Stk.	Feb. 26	†14	56/-	Brentford A Consold.	261—266	5 5 8	..
734,920	,,	,,	†11	55/-	Do. B New	204—209	5 5 8	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
221,400	,,	June 11	4	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	10⅞	Brighton & Hove Orig.	208—213	5 3 4	..
244,200	,,	,,	8	7⅞	Do. A Ord. Stk.	154—159	5 0 8	..
530,000	20	Mar. 26	19½	22/6	British	44—45	5 11 1	35
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
245,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	—	..
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	5 1 2	..
660,000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	8	8	Do. 3 p.c. Deb. Stk.	69½—71½	4 3 11	55½—55½
800 000	Stk.	,,	4	4	Continental Union, Ltd.	76—79	5 1 3	37
200 000	,,	,,	7	7	Do. 7 p.c. Pref.	115—118	5 18 8	..
278,400	—	—	—	11½	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	5½	Derby Con. Stk.	128—125	4 16 0	..
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	10/-	European, Ltd.	17½—18	5 11 1	..
16,827,185	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98—102	4 15 6	73—74½
2,600,000	,,	,,	3½	3½		76—79	4 8 7	50½—60
4,062,235	,,	,,	4	4		96—99	4 0 10	74—75
4,674,850	,,	June 11	3	3		72½—74½	4 0 6	..
130,000	,,	,,	10	10		..	—	..
258,740	Stk.	Mar. 12	6	4½	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16½	5 11 4	..
86,600	—	—	—	9½	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7½	7½	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅝	5⅞	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	5 12 6	59½—62½
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
235,242	Stk.	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	..
2,498,905	Stk.	Feb. 26	10	5	Liverpool 5 p.c. Ord. { A B	211—213 / 145—148	4 13 11 / 4 14 7	..
806,083	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4¾	6 9 9	..
250,000	100	April 1	4½	4½	Met. of Melbourne 4½ p.c. Deb.	99—101	4 9 1	96½
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	6 13 4	9
1,876,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	7/8	North Middlesex 7 p.c.	14—15	5 2 6	..
300,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	6 11 2	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	6 9 0	..
60,000	50	Feb. 26	13	65/-	Portsea, Island B	128—131	4 19 8	..
100,000	50	,,	12	60/-	Do. C	118—121	4 19 2	..
52,000	50	,,	10	—	Do. D	..	—	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	6 13 4	2
499,960	5	June 26	5	2/6	,, 5 p.c. Pref.	4½—5	5 0 0	3½—3½
521,600	100	June 2	4	4	,, 4 p.c. Deb.	91—93	4 6 0	81
—	—	—	—	4	,, ,, 1911	..	—	..
345,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½—11	5 9 1	..
125,000	50	July 1	5	5		47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	4 9 8	..
209,984	,,	,,	10	10	Do. B	222—224	4 9 8	..
633,500	,,	,,	10	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	6/-	South African	10½—11½	7 16 6	..
6,609,895	Stk.	Feb. 10	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	4 16 8	77—77½
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	59—63
224,830	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	5 8 5	..
60,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—112	4 9 8	..
135,000	,,	—	—	48/4	Do. West Kent.	..	—	82
187,558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	..
647,740	Stk.	May 14	5	5	Southampton Ord.	99—102	4 18 0	..
190,000	Stk.	Feb. 12	7½	7½	Tottenham District { A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	5 8 8	..
782,275	,,	,,	6	6		115—117	5 2 7	..
181,355	,,	June 26	4	4		87—89	4 9 11	..
189,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	6 6 8	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
236,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	103½—109½	4 11 4	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8½	78/9	Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6½	63/9	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	55/1½	,, C 3½ p.c.	110—115	5 2 9	..
852,000	,,	,,	6½	57/6	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6½	63/9	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

† Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS-FITTERS. Sheerness Gas Company.
STOKER AND HANDY MAN (KIDWELLY). Applications to Willey and Co., Exeter.

Appointment Wanted.

GAS ENGINEER. No. 6176.

Gas-Works for Sale.

BATEMAN BROS., Stockport.

Plant, &c. (Second Hand), for Sale.

PURIFIERS, &c. Limerick Gas Committee. Tenders by May 22.
SCRUBBER, CONDENSERS, MOUTHPIECES, PIPES, RETORT-HOUSE GOVERNOR, &c. Workington Gas Department. Tenders by May 23.
STEAM ENGINES AND BLOWERS. Aldershot Gas, &c., Company.

Plant, &c. (Second Hand), Wanted.

CONDENSER, EXHAUSTER, BOILER, WASHER, AND TANKS. Cannock, &c., Gas Company.
PURIFIERS. No. 6179.

TENDERS FOR

Coal.

BARROW-IN-FURNESS. Tenders by May 30.
BURY CORPORATION.
GLOUCESTER GASLIGHT COMPANY. Tenders by May 30.
LEEK LIGHTING COMMITTEE. Tenders by May 26.
LEIGH (LANCS.) CORPORATION. Tenders by May 26.
NEWHAVEN GAS COMPANY. Tenders by June 1.
OXFORD GAS COMPANY. Tenders by May 15.
PLYMOUTH GAS COMMITTEE. Tenders by May 20.
SHREWSBURY GASLIGHT COMPANY. Tenders by May 26.
STRETFORD GAS COMPANY. Tenders by May 24.
SUTTON (SURREY) GAS COMPANY. Tenders by June 1.
TEIGNMOUTH URBAN DISTRICT COUNCIL. Tenders by May 27.
TIVERTON TOWN COUNCIL. Tenders by June 3.
WARRINGTON GAS COMMITTEE. Inquiries by May 31.

General Stores (Lead Piping, Lime).

LEIGH (LANCS.) CORPORATION. Tenders by May 26.

Light Oils.

DEAL AND WALMER GAS AND ELECTRICITY COMPANY. Tenders by May 23.

Pipes.

LEIGH (LANCS.) CORPORATION. Tenders by May 26.

Sulphuric Acid.

LEEK LIGHTING COMMITTEE. Tenders by May 26.

Tar and Liquor.

LEEK LIGHTING COMMITTEE. Tenders by May 26.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

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Resists 4500° Fahr. Best for GAS-WORKS.
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THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, p. 361.

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GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

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Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

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SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
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GAS Engineer, over Twenty Years' Experience, Coal, Gas, and Residuals, wishes EMPLOYMENT. Good References. Over Military age.
Address, No. 6176, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

STOKER and Handy Man Wanted for Kidwelly Gas-Works. Annual make, 5 Millions. Must be used to Shovel Charging, Engine, and Exhauster. Wages for first four months 40s. Weekly; after that period, 32s. Weekly, with Free House and Gas.
Apply, stating Age, Experience, Height, with Reference, to WILLEY AND CO., LIMITED, EXETER.

WANTED—Gas-Fitters. Wages, 7d. per Hour and War Bonus.
Apply to the MANAGER, Gas Company, SHEERNESS.

PURIFIERS Wanted.—Sets 12 ft. and 18 ft. square PURIFIERS wanted, with 12-inch or 14-inch Connections.
State Age, Makers, and Price to No. 6179, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Two Vertical 25 H.P. Tangye STEAM-ENGINES, and two No. 7 STURTEVANT BLOWERS, driven (belt) by above Engines.
Can be seen on Application to THE SUPERINTENDENT, Aldershot Gas, Water, and District Lighting Company, North Camp Gas-Works, FARNBOROUGH, Hants.